

A COMPLEAT
T R E A T I S E
O F T H E
GRAVEL and STONE:

WHEREIN
All their SYMPTOMS, CAUSES, and
CURES, are mechanically accounted for.

W I T H
ARGUMENTS in Defence of the Possi-
BILITY of DISSOLVING the STONE
in the BLADDER: All drawn from
REASON, EXPERIMENTS, and
ANATOMICAL OBSERVATIONS.

The THIRD EDITION, with Additions.

To which is added,

A DISSERTATION upon the OPERATION of
NEPHROTOMY; or the POSSIBILITY of CUT-
TING into the KIDNEY, for the EXTRACTION of
the STONE, when it is too large to pass; too
hard to be dissolved, and occasions PAINS above the
Strength of human Nature.

By NICHOLAS ROBINSON, M. D.
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L O N D O N:

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TO the HONOURABLE,
Sir Hans Sloane, Bart.
PRESIDENT
OF THE
COLLEGE of PHYSICIANS,
AND OF THE
ROYAL SOCIETY, &c.

SIR,



Here present you with a
new Edition of my Trea-
tise of the Gravel and
Stone: And tho' it had the
Misfortune to be published, before I
had the Favour of your Acquain-
tance;

DEDICATION.

tance; yet I have so thoroughly revised this Edition, and made such considerable Amendments to the Whole, as I hope will render it a Work, not unworthy of your Acceptance.

You have always appeared, Sir, a professed Patron of Learning and the Sciences: And it's suitable to the Greatness of your Character, and the Dignity of your Station, to protect whatever has a Tendency to relieve the Pains and Calamities of Life; and soften the Miseries and Afflictions of human Nature.

FEW Diseases, I believe, Sir, have been more frequent of late Years, than this of the Stone! None I am sure more exquisitely painful to the Patient: Nor do I know any, that gives him so melancholy a Reflection; especially when the Stone is large, and the Return of the Fits frequent.

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DEDICATION.

I am very sensible, that the Dissolution of the Stone by Medicine, has, for a long Time, been exploded as impracticable; tho' I must confess, I never yet could come into that Sentiment: I always was of Opinion, that few Distempers are incurable; and that only our Ignorance of the Causes, make some more difficult to handle, than others: But, that if we could see into the first Spring, and original Cause of the most stubborn and obstinate Maladies, we should then find them as tractable and easy to cure, as those that lye more obvious to our View.

It is none of the least Misfortunes I encounter, in Publishing this Treatise; that I have undertaken a Task I am no ways equal to: And therefore should have been much better

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pleased,

DEDICATION.

pleased, if any Gentleman, of more consummate Learning and Experience, had thought proper to engage upon this Subject.

I must indeed confess, that to oppose a single Opinion to the collected Force of so many great Men's Judgments, and in an Age so fruitful in Discoveries; and to be the first that explores this untrodden Path, requires a Soul clear of these Passions and Prejudices, that are so apt to misguide the Sentiments of the rest of Mankind. However, I am persuaded, that if the Positions I have here advanced, in Defence of a Dissolution, be brought to the Test of right Reason, the Arguments will appear unanswerable: And notwithstanding envious Criticks may object and cavil against the most evident Matters of Fact, yet no Arguments are strong against Demonstration.

PER-

DEDICATION.

PERSUADED of the Truth of these Sentiments, I have undertaken, in the following Pages, to relieve the Stone; and endeavoured to demonstrate the Possibility of its Dissolution, and the Reasonableness of Attempting that Operation with Success: And if my Thoughts upon these Subjects, be but conformable to the Sentiments of wiser Judges, I have my Desire; if not, I cannot help it! I am not the first that has failed in his Attempts.

But I am not so vain as to think the following Discourse destitute of Errors; neither will I trespass so far upon your Goodness, as to invoke your Patronage of them; I only am in Hopes, that other Gentlemen, after your Example, will be so candid as to pass them over.

I hear-

DEDICATION.

I heartily embrace this Opportunity, to pay you my most grateful Acknowledgments for all Favours; and do assure you, that no Satisfaction can be greater, than in having this Occasion to profess to you, how much I am

Your most obliged,

and most obedient

Humble Servant,

NICHOLAS ROBINSON:

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P R E F A C E.



AMONGST the many Arts and Sciences, that the Invention of Mankind has brought to Light, there is none more deservedly honoured than this of Physick: For whether we consider the Dignity of that noble Creature Man, which is the Object of its Studies; or the End it pursues, in attempting to restore his lost or impaired Health; certain I am, that for many Ages it was had in most high and reverend Esteem, not only amongst all civilized Nations, but even in the most barbarous Countries, where the Sense of Humanity was not quite extinct.

A Physician, therefore, that resolves to make the good of Mankind his chief and principal Care; and is not byassed in his Practice, by any mean Views, or narrow selfish Ends,

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Ends, is a real Blessing to the Place where he lives: Nor can Heaven and Earth afford stronger Motives, for Diligence, for Virtue, and the other Endowments of a generous Mind, than in making him the Instrument of relieving the Infirmities and Miseries of human Nature.

Now as the Physician is commissioned to be the Guardian of Life, and the Restorer of Health, in all Cases, where the Constitution is impaired; or its Fences broken down, through the Violence of a Disease; so has he every Reason, that can oblige a worky Mind, to be just to his Character, and the Dignity and Honour of his Profession.

Nothing but the Welfare of Mankind in general, and the Frequency of the Stone of late Years, could have prevailed upon me to attempt a Revisal of the following Treatise: And I persuade my self, that the considerable Improvements, I have made in this Edition, will render it a Work very serviceable to all Persons, that have the Misfortune to suffer under this deplorable Malady.

I have heard it confidently asserted by a Gentleman, of known Abilities, in Marine Affairs, that let a Mariner be never so well skilled in the Mathematicks, and Use of the Compass; yet, unless by Experience he reduces those Rules to Practice, he will ever be
liable

The PREFACE.

liable to Dangerous Hazards in sailing; and cannot safely be entrusted with the Government and Direction of a Ship, from the Harbour, to any distant Port: And this is a strong Argument with me, that, tho' the Theory be very necessary, to qualify any Gentleman in the speculative Knowledge of any Art; yet Experience is the great Master, that must compleat him in the Practice.

Nor does this Argument hold so generally true, in any of the Arts and Sciences, as this of Physick; for let a Physician read all the most excellent, physical Authors in the Globe; and be never so great a Proficient in the Rules of Practice; yet, unless he frequently converses with the Sick and diseased; and often visits the Patient upon his Bed of Sickness, he will still be a Novice in the Practice and Application of suitable Remedies; because it is one Thing to know the Nature, Causes and Cure of Diseases by Books; and another to be able to apply that Knowledge to the Relief of the Sick; by obviating all the particular Circumstances, that affect the Patient.

In the speculative Knowledge of the Cure, all his Scheme lies regular before him; and Things appear in so clear a Light to his View, that he is surprized any Physician can take wrong Measures: But when he comes to put this Theory in Practice, and make a Transi-
tion,

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tion, from the Causes to the Cure, then is he at a loss to know, how to take his Measures, for want of Experience to direct him in the Application of suitable Remedies.

It is none of the least Misfortunes, Physick labours under, that we have been so strongly byassed in Favour of the Ancients, as not to give way to Truths, when advanced by modern Discoveries. Certainly there were those in former Ages, that were Ornaments to the Profession, and justly deserving of the highest Encomiums for their great Learning: yet the honourable Esteem we pay their Memories, tho' well grounded, should not oblige us blindly to follow all their Dictates. We have reason to believe, that as there were Masters of Physick, and those that justly deserved the Title of Physician; so were there some, that were mere Scholars, whose Works have been handed down to us, tho' not deserving of that Care, that has been taken in their Preservation.

Indeed, when I find their Sentiments to agree with Reason and Experience, there I close with their Judgment, and pay a just Deference to their Authority; otherwise I always preserve a Freedom of Will, to reject what I think not well grounded, according to that trite Adage.

Laudamus Veteres, sed nostris utimur Annis.

The PREFACE.

While this Work was in the Press, the Printer was pleas'd to inform me of a Mistake, as he judg'd I had made, in Page 190, concerning the Passage of a Stone above an Inch about; and that two Physicians had given their Opinions, that it was absolutely impossible, a Stone of that Bigness should pass the Urethra: Upon this I was oblig'd to produce my Vouchers, in Defence of that Position; for I do not think there can be a more vile and wicked Thing, than for a Physician to disguise the Truth, and knowingly impose a Falshood upon the World: It's what I always abhorr'd, and have chosen rather to conceal some very surprising Cases, than publish them, because of their extraordinary Nature.

If these Gentlemen would reflect a little more upon the Powers of Nature, the Force of Medicines, and the Pliableness and Dilatability of the urinary Passages, before they so peremptorily give their Judgment; the Number of Impossibilities, I am persuaded, would mightily lessen; and many Cases, in Physick, would find great Relief, that now are ranked amongst the Number of Incurables.

In short, the Gentleman who pass'd this large Stone, was Mr. Duckett Attorney of Leicester; after which he subjoins in his Letter to me, dated September 28, 1723.

*" Since the Passage of this Stone, I have been
extream*

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" extream easy and well; all Pains are vanished: my Water is cool; and I am, as tho' I had never been amiss.

To conclude, tho' the Importunity of Friends is generally the Apology most Authors make, for the publishing of their Works; yet this has no such Advocates to plead in its Favour; for scarce a Friend was apprized, I intended to revise this Treatise, before the Manuscript was under the Direction of the Printer's Hand. The Good and Benefit I owed to my Country, both as a Gentleman, a Physician and a Christian, were the sole Motives that prevailed upon me to publish it.

And I only entreat the courteous Reader, (as my Affairs would not always permit me to revise the Sheets, as they came from the Press) that he would be pleased, to make favourable Allowances for human Infirmities, lesser Errors and Mistakes, which, in so much Variety of Argument, upon so difficult and abstruse a Subject, might not unreasonably be supposed to escape the greatest Care.

College of
Physicians,

In *Warwick-Lane.*

Dec. 6, 1733.



A COMPLEAT, NEW,
TREATISE
OF THE
GRAVEL and *STONE*.



PART. I.



INTRODUCTION.

IN the Preface to my Treatise of sudden Deaths, I have so fully demonstrated the Necessity of right Principles, and a just Theory, in order to ascertain a successful Practice in the Cure of Diseases; and so clearly obviated the Cavils and Exceptions of some late Writers, against the

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Use

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Use of Principles in Physic, that I cannot, for my Life, conceive, what can fairly be objected, in Answer to the Arguments advanced upon these Subjects.

THEY, that are pleas'd to consult that Preface, will manifestly perceive, that *Hippocrates*, *Galen*, and all the great Ancients, remarkable for their Learning and Experience, were unanimous in their Sentiments, that it was absolutely impossible for a Physician to set about the Cure of Diseases, with any tolerable Prospect of Success, unless he was first very well appriz'd of their Nature, Cause, and the Principles upon which they are supported.

I AM sensible how subject the best of us are to Mistakes; more-especially when we attempt to apply these general Laws of Philosophy, to trace out the Principles of Truth in any of the Arts and Sciences: To be guilty of Over-sights and Errors, is incident to the Frailty of our Nature, and unavoidable in this obscure State of Things; but to persist in Errors, once detected, is the highest Reflection upon our Nature; and, at once, discovers how difficult it is to prevail with our way-ward selves, to forsake Opinions, imbib'd in our tender Years.

WHO could ever imagine, that the Circulation of the Blood should remain a Secret,
for

of the Gravel and Stone.

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for so many Ages, when there were such evident Reasons in Defence of it's Existence. The very swelling of the Veins beneath the Ligature, in Cases of Bleeding, was a manifest Proof, that the Blood was reconvey'd from the Extremities of the Body to the Trunk, and consequently to the Heart: And the Impulse of the Heart; it's Force and Motion, together with the Pulse of the Arteries, were a strong Indication, that, by those Instruments, the Blood was convey'd to all Parts of the Body for Nourishment; for we are sensible, that it could not oppose the reflux Blood, returning by the Veins, to the Heart: I say, a little Reflection will surprize a thinking Mind, that a Point of so great Moment, with such evident Marks of it's Existence, should lie so long conceal'd from the Sagacity of our Ancestors.

THE Truth is, we reason with ease concerning the Nature of Principles, and the Discovery of Things, once they are found out; and are surpriz'd, that the Professors of Science preceeding our Days, did not hit upon many of those Secrets, that were reserved for the Discovery of our Times: And, to speak out, there is oftentimes but a very thin Partition-Wall between the Discovery of the most important

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Truths, and their absolute Darkneſs : Yet, after all, I very much queſtion, whether, had we lived in the Ages of our Fore-fathers, we ſhould have been more ſharpſighted, and happy in the Diſcovery of theſe fundamental Truths, that ſo plainly appear to have eſcaped their Penetration and Sagacity.

IT is the ſureſt Mark of a true System, or Theory, that thoſe Principles, upon which it is conducted, be able to anſwer all the Intentions of Nature, through all her poſſible Changes, Conſequences, and their Effects: And when once we are furniſhed with a Stock of proper Experiments, and are got into the right way of purſuing Nature, it is impoſſible to conceive what a vaſt Progreſs we ſhall make in any of the Arts and Sciences.

INDEED there is one Obſtacle, that ſeems to curb the Ambition of carrying our Views too far; and that is, the Difficulty of purſuing Experiments beyond the reach of our Senſes: For in this caſe, when Objects are either too little for the Diſcovery of our Faculties, or inacceſſable by Reaſon of their Remoteneſs, we muſt then attempt to diſcover their internal Frame, by reaſoning upon their Principles and viſible Effects: And this is the only Way to come at the Knowledge of thoſe Objects, that are

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too far removed from the Perception of our Senses.

And if these Principles are capable of accounting for all the Phænomena of Diseases, their Symptoms, Causes, and Effects; then are they to be taken for true Principles, because they answer the whole End and Purpose of Nature. And upon these Grounds, I proceed, in the Course of the following Pages, to demonstrate, that most of the Paroxysms, and Symptoms, that infest either Kidnies, or Bladder, for the most part, arise from the Stone, or Gravel, generated in those Organs; and the Cause of these Concretes, when they happen to infest the Bladder, we have derived from a Nucleus, generated in the Kidnies; and the Cause of that Nucleus from an attracting Principle in the Salts and earthy Parts of the Blood, as they come to the Kidnies for Secretion; and we have demonstrated this attracting Principle in the Salts of the Blood, from divers Experiments we have made upon the Calculus taken out of the Bladder, by dissolving a good quantity of this concremented Matter, finely powder'd, in a Basin of warm Water; which, as soon as cold, separates into two distinct Masses of Matter, which take their Places according to their Specific Gravities: The gravelly Corpuscles subsiding to the

bottom, while the Salts shoot into Chrystals, and settle about the Sides of the Bason.

Now the Reason why these Chrystals incline most to the Sides, is, because the Resistance of the Sides of the Bason arrests the Motion of the Water, and obliges the Salts to stagnate before the Corpuscles of Water in the midst of the Bason lose their Motion : And this is the Reason why all the Salts capable of ChrySTALLIZATION recede from the Center, and incline to the Sides of the Bason where the Motions of these Salts are slowest ; the Attraction of their Corpuscles strongest, which is the Cause of their uniting in Contact with each other, and forming these Chrystals.

THESE Experiments are more than bare Suggestions, they prove the very Principles themselves, without which it is absolutely impossible to go upon any certain Grounds. If, then, the Salts continue in Water without concreting, while it is in Motion ; and run into Clusters of Chrystals, after it is cold, and suffer'd to be at Rest, is not this as clear a Reason, as can be given, that some Modes of Motion, in the secreting Vessels of the Kidnies, are in Fault, why the saline Corpuscles of the Fluids, in any Period of our Lives, are attracted to each other, and form Stones, or Gravel ; since
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before that Period, they were not subject to any arrests that might disturb the Passage of the Urine.

THUS, I think, we have, from the simple Laws of Gravitation, Motion, and Attraction, clearly proved the several Phænomena of Gravel and Stone; as the Generation of these Concretes depends upon the Force of these Laws in a direct Chain of Consequences, all supported upon a close and easy Connexion; and which, I think, cannot be broken in any particular Link, without greatly undermining the Foundations of the whole Superstructure.

I MUST confess, with a great deal of real Concern, that, in perusing the former Editions of this Work, I found many Passages extremely faulty; several Things very ill observed; some too prolix for the Subject they related to; others not clearly enough explain'd; and many Points, by no means proper for a Dissertation upon the Gravel and Stone: But I may reasonably presume upon the Reader's Pardon, when he reflects, that this Treatise was the Fruit of my Juvenile Years; and written very near twenty Years ago; and at a Time when I was more conversant in the Writings of the Ancients, than in the Practice of the Moderns.

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BUT, notwithstanding the Faultiness of the former Impressions, this Work, with all it's Mistakes, was well receiv'd by Men of Learning, both at Home and Abroad: So that the learned *Mangetus*, Phyfician to his Royal Majesty, the King of *Prussia*, has done me the Honour, to insert a very elegant, Latin Abridgment of the whole Treatise, under the Letter R. in his *Bibliotheca Script. Medic. Veter. & Recent.*

HOWEVER, in this third Edition, I was resolv'd to make a careful Revival of the whole Book. To expunge what was unnecessary. To contract those Subjects that were over prolixly handled. To explain, and set in the clearest Light, and Order, those Points, that were obscure and doubtful; and make such farther Additions and Alterations in every particular Article, as should render the whole, *A Complete, New, Treatise of the GRAVEL and STONE.*

IN writing of this Work, I have taken care to lay all the several Chapters, in that exact and natural Order; that the Reader will easily perceive, as he goes along, the several Subjects arise to his View, not unlike some regular, beautiful, Landskip, or Grotto, whose Entrance is only a Prelude to some important Scene, that lies more reclusely conceal'd: And for whose Grandure, Beauty,

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Beauty, and Harmony, all the other Parts were contriv'd: For the several Subjects are so closely united, that they clearly discover the certain Connexion between the Theory and Practice; and the Truth of the Principles upon which both are supported.

AND this is the Reason, why this whole Treatise will appear only one continued Chain of Causes, Effects, and their Consequences, drawn out from first to last; in which the Second Chapter is a necessary Consequence of the First; the Third of the Second; the Fourth of the Third, and so on through the whole Book; each Chapter expressing a Relation to, and having a necessary Connexion with that immediately going before, and that which next follows, through both the Theory and Practice: And this I take to be the most natural Way of treating Diseases, as it leads the Mind more gradually into the Nature of the Symptoms, their Causes, and Effects, with all the particular Circumstances that arise upon these Subjects.

FOR this End and Purpose, I have, in the first Part, considered the Structure and Mechanism of the Organs, ordained by Nature for the Secretion of the Urine. The manner how this Fluid is separated from the Blood, and secreted by the Bellin-
nian

nian Tubes. Having done with these Points, I then proceed to treat of the predisposing Cause of Gravel and Stone, or the Causes that dispose the Constitution to this Disease, in Cases, where, neither Gravel, or Stone, are hereditary; that is, how the Constitution of the Kidnies and Bladder, which before, was perfectly healthful, perfectly sound, and perfectly free from the Embarrassments of either Stone, or Gravel, comes to be affected with these petrified Concretes: For it is most certainly true, that there must be a Disposition to, before there can be a Generation of a Disease; And this Disposition, I call, the predisposing Cause; because, it exists in the Body before the Generation of either Gravel or Stone; and is the Cause why they do exist: Now the Question is, What is the Cause of that Disposition? and this must arise from some of the Non-naturals, but chiefly our Diet.

As for the other Causes, *viz.* the Air, Exercise, and the rest of the Non-naturals, I am sensible, they may occasion a Fit; but, I very much question, whether any of them is powerful enough to produce the Causes of the Stone and Gravel, which is the Reason why I have divided the Non-naturals into two distinct Chapters, *viz.* Those that generate
the

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II

the Matter of the Stone ; , and those that put it in Motion, and produce a Fit.

AFTER this, I go on to examine into the Nature of the Materials, that constitute both Gravel and Stones; their manner of Generation and Accretion in both Kidnies and Bladder ; their constituent Principles, and the Modus of Attraction in the Corpuscles, necessary to produce variety of Stones; for I have endeavour'd to demonstrate, in the ensuing Discourse, that the different Impulse and Motion of the Fluids will vary the Figures of the Salts of the Blood, and of the Juices, that come to the Kidnies for Secretion; and that the different Figures of these Salts will vary the Texture of those Concretès; and consequently generate Stones of a different Figure, Consistence, and Make.

HAVING thus far led the Reader, by gradual Steps, through a Chain of Consequences, all supported upon a plain and easy Connection of Causes and Effects, I then proceed to examine into the Consequences of the foregoing Causes, and all along clearly discover to the Reader, the just Progress of the Symptoms, that arise from every Degree of the foregoing Causes; and how different Constitutions, under the same Disease, have a Power to vary the Symptoms ;

toms ; and lastly, have clos'd the first Part with a Prognosis of the Event ; or, a Dissertation upon the Principles, that instruct us how to judge of the Issue of the impending Symptoms, or those that arise from the severity of the Paroxysms, and the frequency of their Return : All these several Points, I have grounded upon the Principles of Natural Philosophy ; and have taken nothing for granted, but what is established upon Observation, Experiments, and evident Matter of Fact.

IN the Second Part, which contains the curative Indications, and a Practice grounded thereupon, I have pursued the same Principles through every Chapter ; so that it is only a Consequence of the former : In this Part, after I have considered the Powers and Assistances we have from Nature ; and dispos'd the Non-naturals, especially our Diet, which gave Being to the Stone and Gravel, in such a Manner, as to be assisting in the Cure of these Concretes, I then go on to discover the Practical Principles and Medicines necessary to relieve the Patient under the most distracting Symptoms.

HAVING thus far proceeded in the Cure, I then attempt to lay down the Methods most proper to expel little Stones and Gravel

vel from both Kidnies and Bladder, to which I have subjoin'd several Processes, that most naturally fall in with these Indications.

THESE several Points effected, I then, upon the same Principles, go on to examine into the Reasonableness of a Dissolution, by considering all the Lets and Impediments that obstruct the Dissolution of a Stone in the Bladder: In the Prosecution of this Point, I all along answer to the Objections brought against the Possibility of a Dissolution, by Arguments that incontestably prove, that one Body will work upon a harder Body, in order to it's Dissolution, which yet will not work upon a softer, at the same Time, tho' equally expos'd to the Force of it's Operation: And the only Point we are in Pursuit of is, to discover a Remedy, that will work upon the Stone in order to it's Dissolution, and not affect the Bladder at the same Time: In this important Point, it is a particular Satisfaction to me, when I reflect, that I have the great Mr *Boyle*, and the learned Professor *Boerhaave* on my Side the Question, who both, in the strongest Terms, declare for the Possibility of a Dissolution: And if we prove a Dissolution of the Stone possible, who knows what Improvements

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provements the Sagacity of future Ages may make upon these Hints.

To those that suffer under the Tyranny of the Stone, this Discourse certainly is of the last Importance ; for, in Allusion to the Poet, it highly concerns those unhappy Mortals, to have all the Assistance possible from Medicine, before they submit to that extreme, and sometimes fatal, Operation, of Lythotomy.

*Cuncta prius tentata ; sed immedicabile
Vulnus*

Ense recidendum. ——— OVID. MET.

So that the Knife is never to be employ'd, till all other Means have been try'd in vain.

I think it is agreed, on all Sides, that the Stone is attended with Symptoms, the most dreadful and distracting, of any Disease incident to affect the Body. The Agonies, the Torture, the racking Twinges, that frequently assault him, when the Stone is large, and the Fits frequent, often fling the unhappy Patient into the most deplorable Circumstances of Misery, that it is possible for human Nature to groan under.

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AND tho' some Authors have disputed whether the Affection of the Stone be really, and properly, a Disease of itself, or only a Cause; yet surely the dreadful Effects, proceeding from it's Motion, and the painful Impressions it makes upon the Kidnies and Bladder, must be sensible to every one, who, for any considerable Time, have labour'd under it's Tyranny: So that no Distemper can affect either the Kidnies or Bladder, but what may have this for their Parent: And, I think, I may, with some Reason, define all the Affections of these Organs: An Illiad of Miseries deducing their Being, from this Origine *viz.* The Stone: Since, if it be not a Distemper of itself, because, in an absolute Sense, it neither pains of itself; neither of itself is there any Loss of Continuity in any Part; yet most certainly a Cause, and Symptom, of the most dangerous Affections; and this appears in so evident a Light, from the Number of Symptoms, occasion'd by the Stone, that I think there is little need for me to enlarge upon further Proof.

To conclude: Through the several Parts of the following Discourse, I have conducted all Things with that exact Order and Regularity, that I might neither give Umbrage to illiterate Quacks with their Empirical

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perical Remedies, to delude the Patient into a fatal Security; nor have I so far prostituted the Laws and Indications of Cure, as to make the Patients themselves Judges of the Success of Medicines, and the Method of a judicious Application.



CHAP.



C H A P. I.

*Of the Structure, Mechanism, and Action
Of the Organs, ordained by Nature, for
the Separation, Secretion, and ultimate
Reception of the Urinous Fluid, before it
is discharged from the Body.*



S I intend to new model this whole Treatise; and ground all it's several Parts upon Principles the most evident and conclusive ; so I think it will be highly necessary, before I proceed to discourse of these Affections, that I first give the Reader, a brief, Anatomical Description of all the Parts, that chiefly, and more immediately suffer under their Tyranny ; that, from a Knowledge of the Structure, Position, and Use of the Parts, every Person, incident to Stone or Gravel, may better know the Motions of his Malady, more exactly discover the Parts it settles in ; and be enabled more accurately to disclose

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to his Physician, the Symptoms, and Accidents that oppress him, under a Fit of the Stone.

ALL Men of Genius, bred up in the Faculty of Physick, generally, perceive a readier Disposition in the Powers of the Mind, to study the Diseases of some particular Parts, preferable to others of the Body. Many Times, the unhappy Indisposition of some considerable Person of the Family, may prove a strong Argument, to provoke the Genius to this Application. The excruciating Pains, and dreadful Symptoms of the Stone, that for several Years afflicted my Honoured Father, while I was young in the Profession, was the great Reason, why I so earnestly endeavoured to discover the Cause, and Cure, of so painful and obstinate a Malady.

AND I am perswaded, we should be able to know much more of Diseases, and better discover their Nature, Cause, and Cure, would these Gentlemen, that take upon them to write of these Subjects, favour us with a Dissertation upon the Texture and Connexion of these Organs, that are most contiguous to, and that more particularly suffer under the Tyranny of this Affliction; for nothing conduces so much to a right Method of Cure, as a true Understanding

derstanding of the Nature, and Cause, of Diseases ; nor can we rightly conceive of their Nature, and Cause, unless we acquire a competent Knowledge of the Structure, Mechanism, and Powers, of the Organs, that are the immediate Seat of the Symptoms : And for this Reason, I have, as a preliminary Discourse to my Treatise of Consumptions, given the Reader a particular Dissertation upon the Nature of Nutrition ; as thinking it unreasonable to proceed to discover the Grounds, and Causes of a Decay, Waste, or Consumption, of the several Organs, before I had attempted to discover the Principles of Nutrition, or those Powers of the Constitution, by Virtue of which, Bodies, in Health receive their Nourishment, grow, and increase in Bulk and Stature.

Now as the Kidnies, Ureters, and Bladder, are the several Organs, destin'd by Nature, for the Separation, Secretion, and ultimate Reception of the Urine from the Blood; and as Gravel, Stones, and other fabulous Concretions, most commonly derive their Origine from the impair'd Tone of the foregoing Organs; so we shall confine our Enquiries to those only, that are generated in the Kidnies, and Bladder, because the Patient seldom makes any Complaints

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plaints of these Affections, till they occasion Pain in those Parts.

THE Kidnies are the first of the Urinary Organs, that present themselves to our View. They separate and secrete the Urine from the Blood; and are two in Number, one placed on each Side of the Loins, for the Convenience of their Seat and Action: And tho' it is the Opinion of some Authors, that the Providence of Nature, therefore form'd two Kidnies; that, upon any Obstruction, Stop, or Impediment of one, the other might supply it's Office; yet this Reason appears not at all satisfactory, or in the least conclusive; because they being similar in their Structure, Action, and Effects, all those Causes, that any way discommode the Action of the one, will rarely fail to impair the Motions of the other, at the same Time.

AND this appears in a Suppression of Urine, occasion'd from a Stone or Gravel, lodg'd in either Kidney, which very often obstructs the Action of the Opposite, in such a Manner, that little Urine can be secreted during the Extremity of the Fit; so that if the Right be affected, the Left also suffers: And the Reason of this is, because the same Pair of Nerves, that assists the Action of the one, is disseminated
through

of the Gravel and Stone.

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through the Body of the other also; whereby it comes to pass, that their Motions, Actions, and Defects are mutual.

I AM rather of Opinion, that the Kidnies are double, from the Necessity of their Situation, and the Parts they possess in the lower Abdomen: For had they been originally form'd into one Organ; then that one Organ must have been of a Size and Magnitude, to equal both, from the Necessity of such a Quantity of Urine to be secreted in a given Time: But how an Organ of this monstrous Size, could so conveniently be placed in the lower Belly, without either destroying the beautiful Proportion of the Parts, or impairing the Action of some other Organ, I am unable to conceive: For if you place it in the midst of the lower Venter, then the fore Parts would protuberate with a large Eminence very unsightly to behold; besides, great danger must necessarily accrue from such a Situation or Position of this Organ; least by pressing against the Intestines or Bladder, it might obstruct their Discharges: Again, if you lodge it on either Side, it would necessarily impair the Equilibrium of the Parts, and endanger the erect Posture of the Frame, by inclining the Body more to that Side where the Kidney was seated.

IN Human Subjects, the right Kidney lies under the Liver, which is something more depress'd, than the Left; the Left between the Spleen and Musculus Lumbaris of the same Side; both between the Duplication of the Peritonæum. Each of the Kidnies is endued with two Membranes, the one common from the Peritonæum, the other proper, from the exterior Coat of the Blood Vessels. By their external Membrane they adhere to the Loins; by their Blood Vessels to the Cava and Aorta, and by the Ureters to the Bladder.

THE right Kidney is sometimes connected to the Intestinum Cæcum, and sometimes to the Liver. The left to the Colon and Spleen. These different Connections seem intended, by Nature, more steadily to fix them in their just Position, that no violent Shocks in a Fit of the Stone, nor the Pressure and Action of the circumjacent Parts, in violent Exercise, might be able to displace them; which might frequently happen, had they been less firmly attach'd to the foregoing Organs.

THE Substance of the Kidney is form'd from a Congeries of Blood Vessels, Glands, and excretory Ducts, in the following Manner. The Vena Cava, and Aorta, in their Descent, inclining a little to the Right and
Left,

Left; form the Emulgent. The Emulgent Artery, a little before it penetrates the Kidney, on it's concave Side, is divided into two or three Branches, which, as soon as they enter it's Body, are again subdivided into numberless Ramifications: These of the Artery, in their serpentine Windings, frequently inosculate with each other, and form several Anastomoses, that after infinite Divisions, Convolutions, and Contortions, terminate in Glands. These Glands are of a round globular Figure, and compose the cortical Part of the Kidney, which is about half an Inch thick, and almost of a Liver Colour. From each of these Glands goes a small membranous hollow Tube, which being first discover'd by *Bellini*, were therefore call'd *Tubuli Belliniani*. They spring from the Sides of the capillary Arteries, and extending themselves towards the Pelvis of the Kidney, form these little Protuberances, called, the *Papillæ*; and adjoining to which, is the twelve Branches, call'd *Fistulæ Membranaceæ*, and which empty the Urine into the Pelvis, in order to be discharged by the Ureters into the Bladder.

FROM the Extremities of the capillary, arterial Branches arise the minute capillary Veins, which being divided into the like

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Ramifications, are inclosed in one common Capsula with the Artery, and accompany it through the whole Kidney, going out, where the Artery enters, and terminating in the Cava, reconveys the Blood remaining after the Secretion of the Urine, to the Heart, where it receives new Spirits and Motion.

I MUST confess, that though this Progress of Nature, in the Structure and Formation of the Kidney, is undiscoverable in Adults; yet with good Glasses, it may easily be trac'd in the Kidney of a Fetus, or that of an Ox well boil'd; for in both these Subjects the Extremities of the Blood Vessels, with all their Circumvolutions, and serpentine Windings, evidently appear to be derived from such a Piece of Mechanism as I have here explained.

NERVES the Kidnies receive from the Intercostals, which form a Plexus on each Side, call'd, Plexus Renalis: Lymphæducts also may be observed in the Kidnies, that empty themselves into the Receptaculum Chili.

THE Principal Use of the Kidnies, without doubt, is to secrete the Urine from the Blood; but the Question here is, how, and after what manner this Separation is perform'd, that is, whether the Kidnies,

are only passive Machines to give a Vent to the serose Parts of the Blood, as it is driven by the Force of the Heart and Arteries into the Emulgents ; or do they, by the Muscular Coat of the Arteries, and the springy Fibres of the Bellinian Tubes, the immediate Instruments of Secretion, assist the Division, Fusion, and Percolation of the Blood : And if we attentively consider the Structure and Mechanism of this Organ, there will seem little Reason to doubt, but that the Fluids receive considerable Alterations in their Secretion through the Vessels of the Kidnies ; and these Alterations or Changes, must necessarily be effected from the numberless Checks the Blood receives in it's Motion, through the infinite Divisions, and Windings of the capillary arterial Branches, in it's Passage through the convoluted Glands, the Bellinian Tubes ; and the Fistulæ Membranaceæ : All these several Powers impress their respective Forces upon the Blood, in order to open it's Texture, and extract it's Principles.

Now, as the Blood, according to the Laws of Circulation, is continually driven into the Kindies by the Emulgent Arteries, so the Secretion of the Blood is continual ; and the Urine continually dribbling down the Ureters into the Bladder.

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BUT, besides this Office of altering and secreting the Urine, the Structure and Mechanism of the Kidnies, plainly seem to point out another Use, *viz.* by their Muscular Fibres, to force out any concremented Matter, that may lodge in their Substance; for it appears, by ocular Inspection, that several of the Fibers of a Kidney are muscular, as will appear more clearly, when we come to treat of the Passage of Stones from the Kidnies to the Bladder; and the Cause of that Passage, when it is effected only by the Powers of Nature, without any Assistance from Art or Medicine.

As I only design to speak of those Parts that are immediately affected under a Fit of the Stone, or Gravel, so I shall pass over the Glandulæ Renales, as Appendages to the Kidnies no way concern'd in this Enquiry; and go on to examine into the Structure and Mechanism of the Pelvis and Ureters, as they are the Instruments that convey the Urine, after it's Secretion, from the Kidnies to the Bladder.

THE Pelvis, or Bason, is a Cavity in the Middle of the Kidney, on it's concave Side, which arises from a Dilatation of the Ureter. The Ureters are two in Number, being small, long, membranous Pipes, that arise from the Basons of the Kidnies, which
descending

of the Gravel and Stone.

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descending in the Form of an Italick *s*, pierce the Bladder, on each side it's Neck, with oblique Insertions. The Size of their Bores is naturally conceiv'd to be about the Bigness of a Goose-Quill, tho' the Diameters of their Cavities are very unequal in different Parts, which are wider, or narrower, here and there, through their whole Length, and not in that Part only which passes over, and rests upon the Iliack Artery, according to the Opinion of some Anatomists.

THE Largeness of their Cavities is different in divers Subjects, which are much enlarged in those that have passed many large Stones from the Kidnies to the Bladder. Their Use is to be a Conduit to the Urine, as it flows from the Pelvis to the Bladder. Their Obstruction will cause a Suppression of Urine, and either being affected will excite a Strangury.

THE Vesica Urinaria, or grand Receptacle of the Urine, the Bladder, is seated in the Pelvis, or lowest Cavity of the Abdomen. This Organ, in Men, immediately rests upon the Intestinum Rectum: In Women, upon the Vagina Uteri; in both between the Duplication of the Peritonæum. It adheres to the Navel by the Uraachus degenerated into a Ligament. It's Neck in Men is firmly tied behind to the Rectum,

Rectum. In Women, to the Vagina; and in both before, to the Peritonæum. It consists of three Membranes, the outermost common, which is derived from the Peritonæum: The middle is a Muscular Membrane, composed of carnous Fibres, both longitudinal and circular, that arise from the lower Part of the Os Pubis, and the fore-part of the Prostata, which passing over the Fund of the Bladder, are inserted into the back Part of this Gland in Men, and the Vagina Vteri of Women. As this membranous Muscle is so dispos'd, it clearly appears, that the Fund of the Bladder, by the Action of the longitudinal Fibres, will be press'd forwards towards the Os Pubis, while at the same time, the circular ones lessen it's Dimensions, in order to a Discharge of the Urine.

THE third Coat is nerveose, of exquisite Sense, and therefore is lin'd all over, with an infinite Number of small Glands, that separate a Mucus, to fence it against the acrimonious Salts of the Urine; and some will have this to be it's fourth Coat. At the Neck of the Bladder, to prevent the continual dripping out of the Urine, is placed a solitary Muscle, call'd Sphincter Vesicæ, which keeps the Bladder constantly clos'd; but as it has no Antagonist Muscle

cle to assist it's Action ; so it's Resistance is easily overcome by the Command of the Will, and Compression of the abdominal Muscles forcing downwards, whenever the Bladder is near full, and we desirous of discharging the Urine.

ADJOINING to the Neck of the Bladder is the Urethra it's Excretory Pipe : An Organ, ordain'd by Nature, for the immediate Discharge of the Urine from the Body. This Instrument, I must confess, hath another principal Use, but that making nothing to my Purpose in this Treatise, I shall forbear it's further Description. The inner Surface of the Urethra is of exquisite Sense, and extremely tender ; and therefore is lined with a great Number of small Glands, that separate a mucous Matter, to fence it's tender Membrane against the Acrimony, or Heat of the Urine. The Bladder and Urethra have Veins and Arteries from the Epigastricks and Iliacks ; and Nerves from the two Plexus's of the Pelvis of the Abdomen form'd out of the Par Vagum, and the Nerves of the Os Sacrum united. The Use of the Bladder is to retain the Urine, as it receives it from the Kidnies, that it may not pass from us without our Consent.



C H A P. II.

Of the Nature, Qualities, and constituent Principles of the Urine; as it is the Material Cause of Stones, Gravel; and whatever else is concreted in either Kidnies, or Bladder.



THUS far of the Organs ordain'd by Nature for the Separation, Secretion, and ultimate Perfection of the Urinous Fluid: But before we can penetrate into the latent Causes of Gravel and Stone; before we can proceed to enquire into the Matter of these petrified Concrets; or discover what Effects these Affections will have upon the Organs of the Kidneys, Ureters, and Bladder, and other Parts connected with these, by consent of their respective Nerves; it will be highly necessary, that we examine into the Nature of the Urine, it's Properties, Qualities, and the constituent Principles that compose it; because it is most evidently certain, that the Principles of all Stones, Gravel,

of the Gravel and Stone.

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Gravel, and fabulous Concretions, arise from the Changes and Alterations of this Fluid, after it is separated from the Blood by the fecerning Tubes of the Kidnies.

IF we trace back the Urine to it's Origine, and examine it's first Being in the Body, we shall find it inherent in those Aliments we take for the Support of Life; for such as our Diet is, such is the Chyle, and such as the Chyle is, such is the Blood; and such as the Blood is, such of Consequence will be the Urine; because it is only the Principles of our Diet, Blood, and Chyle, farther elaborated and digested, from the Force and Impression of the Heart, Lungs, and Arteries.

IN the Separation of the Urine from the Blood, in the Kidnies, all the Principles of the Fluids are separated, tho' not equally: For in this Secretion, there is much volatile Spirit, an acid Salt, some Sulphur, very little Oil unless the Body be subject to a Decay, a little fixed Salt, which affords it's earthy Sediment. The Basis of the Urine therefore may most properly be defined; a pure Elementary Water strongly saturated with both acid and alkaline Salts, which Mixture composes a Salt, not much unlike our common Sal Ammoniack,

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Ammoniack, and which contains all the foregoing Principles.

YET, after all, I must ingenuously confess, that it is scarce possible to define the Principles of the Urine, because they are frequently varied, exalted, or depressed, according to the different Natures of the Liquors we drink ; and according to the Quantity of these Liquors we take with our Food for Nourishment : For from a large Quantity of Aqueous Liquors is produced great Plenty of a thin, clear, and limpid Urine.

SOME Authors, of a chimical Turn of Thought, assert, that the Redness, or Citron colour of the Urine, proceeds from the Bile ; but I look upon it rather to be the natural Product of it's Secretion ; and is nothing else, but the more fine Globules of Blood, secreted, at the same Time, with the Serum : And that the Bile or Choler is not concerned in giving Colour to the Urine, appears evidently clear, from a well concerted Experiment, that *Bellini* made use of in his Treatise of Urines, to discover this Point, where he thus reasons : “ *Si igitur Urinæ Color, &c.*” “ If therefore”, saith he, “ the Urine receives it's Color from Bile, which does not sensibly affect the Taste with a bit-
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“ter Twang, because of it's Mixture
“with Water : Then the Bitterness would
“sensibly appear, upon the Evaporation of
“the watry Menstruum, and this in Pro-
“portion to the Quantity evaporated,
“which is false in Fact ; for if you sepa-
“rate all the Water almost from the Sedi-
“ment, you will perceive the Residue ex-
“tremely Salt ; but not the least Portion
“of Bitterness joyn'd therewith”.

THIS is an Experiment, that clearly
decides the Point in Question, *viz.* That
the Bile is not concerned in giving Colour
to the Urine. It's different degrees of Pale-
ness, or High-coulouredness therefore must
chiefly depend upon the Closeness or Lax-
ness of the secerning Tubes of the Kid-
nies, and the Quantity of Salts and Earth
dissolved in the Serum ; for in all Cases
where the Fibers of the Kidnies are too
much relaxed, there the Urine will be tur-
bid, and let fall a dark, obfuscate, earthy
Sediment ; while, on the contrary, under
all too great Contractions, the same Fluid
will be pale, limpid, or flammeous in Co-
lour, with little or no Sediment, but only
a cloud suspended in the watry Men-
strum ; which is an Indication of a greater
or lesser Portion of Salts dissolved in the
Urine.

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AND

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AND, I have observ'd, in some Cases of Bodies, worn out with long Fevers, that, upon Recovery, the Medicines have come away with the Urine, little altered from what they were when first taken ; which strongly argued that all the natural Digestions, the Tone of the Viscera, the Compages of the renal Fibers, were greatly vitiated and broken.

IN Relation to those that are subject to make large Quantities of Urine, many will have this Phænomenon wholly to depend upon a Dissolution of the Sanguineous Texture, in Cases, where the Vinculum of the Blood, by the Force of some long, chronick Disease has been greatly fused, thin'd, and broken ; but though this might happen, and frequently does, yet it is not always an impoverished Blood, that sends out the greatest Quantities of Urine ; for, I have observ'd, sometimes in Persons, whose Blood hath greatly abounded with this serous Latex, that they have not made Urine freely, nor discharged any large Quantity of the same : And the Reason of this is, because the greatest Quantity of the Aliments they took for Nourishment, ran off by the cuticular Discharges. And if we consider the Analogy between the Sweat and Urine ; and the Consent
and

and Agreement there is between the Tubuli Urinarii of the Kidnies, and the fecerning Vessels of the Cutis, as to the Structure and Mechanism of their respective Orifices, we shall have little Reason to Wonder, if those that sweat much, urine little, and *vice versa* ; because in such Cases the Vessels of the Kidnies are so close and compact, and the Blood at the same Time so impoverished, that the Heart cannot invigorate it with a Force sufficient to circulate through the complicated arterial Branches of the Kidnies ; while the cutaneous Glands, being more lax and open, do suffer the greatest Part of the Fluids to pass off, either by Sweat or insensible Perspiration. The same Observation accounts for the Reason, why Persons that sweat much in their Hands and Feet, make but little Urine.

BESIDES, if we consider the Nature of the Serum, which gives Fluidity to the Blood ; and without which, it could not exist in Motion, nor pass those minute Vessels, necessary for the Nourishment of the Parts ; we shall perceive, (when a Quantity of it is extracted in those Diseases, that indicate Bleeding necessary,) the Serum much of the Consistence, Colour, and Taste of Urine ; and, in some

Degree, to have a urinous Smell, though not so fætid as the Urine itself, which Defect of Smell might proceed from it's not being contained long enough in the Body, nor it's having passed those various Circulations, necessary for the Perfection of this Fluid..

BUT, though the Urine is mightily varied, from divers Causes, and especially under different Diseases; yet I very much question, whether any Thing gives it so permanent a Difference as the different Constitution of the Patient; for the Colour, Consistence, and Quantity of Urine, very much depend upon the different Elasticity of the Solids, which imparts different Degrees of Force and Motion to the Circulating Fluids, in order to break their Cohesions, divide their Corpuscles, and extract their Principles; and which of Consequence makes a considerable difference in the Urines of different Persons.

AND this is the Reason, why People of a bilioſe Constitution, are naturally ſubject to make a thin, clear, flammeous coloured Urine, plentifully ſtock'd with Salts; for all bilioſe Constitutions abound with Salts; which are extracted from their Aliments, by the Force of the Heart, Lungs and Arteries; for theſe ſeveral Organs have a Power to grind down our Aliments into
the

of the Gravel and Stone.

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the minutest Parts, whereby their most intimate Principles, consisting of Salt and Earth, are eliminated.

THOSE Persons that are of a sanguine Habit, generally, in Health, discharge their Urine of a deep Amber Colour; and the solid Contents, mix'd with the watry Menstruum, is of a redish Cast, which after it's Separation, produces, a red, bright, sandy Gravel, plentifully stock'd with a saline sulphureous Matter, that appears through the minute Strata of Earth, that invest them.

THOSE, of a phlegmatick Constitution, from the greater Openness of the Tubuli urinarii, generally make great Quantities of a thick, heavy Urine, that separates a large Portion of a whitish, earthy Sediment, after it has stood some Time: And this Constitution is most liable to be affected with the Stone, from the Slowness of Motion in the Fluids, as they come to the Kidnies for Secretion.

INDEED, it seldom happens, that any Constitution is previledg'd from the Gravel or Stone, if there be a Disposition favouring these Affections, and we live upon a Diet naturally productive of Salts; but I think, in the general, that biliose People, or Persons of a biliose Constitution, are most

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most liable to the Gravel ; those of a phlegmatic Temperature to the Stone : And the Reason of this Difference, I conceive, arises from hence ; That, in the former, the greater Elasticity of the Fibres, assists the Discharge of the Matter of the Stone with the Urine, while it is only Gravel : While, in the latter, the Slowness of the Motions of the Juices, in their Secretion through the Kidnies, gives the fabulous Matter Time to separate ; to Concrete in Clusters, and consequently to form a Stone.

THE Digestion of the Urine, that is, the intimate Mixture of the Principles with the aqueous Part, depends upon the Attrition of the solid Contents by the Force of the Stomach, Intestines, Heart, and Arteries, before it comes to the Kidnies for Secretion. This Perfection of the Urine is discoverable after it's Discharge from it's Colour, Consistence, and Length of Time before it's Principles break and separate from the Fluid Mass. The Urine generally, under a sound State of Health, will be discharg'd of a pale Yellow, or light Amber Colour. It's Gravity and Consistence little different from Spring Water, save that it is a little more weighty ; and because it is well digested, and it's Principles thoroughly

thoroughly combined, and mix'd with the fluid Part, it will remain in the Urinal 12, 16, or 20 Hours before it affords the least Mark of a Change; or separates any discoverable Quantity of Matter for a Sediment.

AND the Reason of this is, because the solid Contents, or solid Corpuscles of the Urine are to minutely divided, as to be very nearly as strongly attracted by the aqueous Menstruum, as by each other.

THIS is a sure Indication that the Constitution is strong and hale, and the several Organs under a good Disposition of Health; but a very dangerous Portent under Fevers, or any acute Disease; for it is an Indication that nothing of the febrile Matter separates this Way, and that the Blood continues crouded with vitious Principles.

THOSE Persons, that find any Impediment, or Weakness, in the Urinary Organs, ought to be highly careful never to restrain their Urine longer, than the course of Nature requires it should be retained; for we have known fatal Effects to have ensued upon a voluntary Suppression of this Fluid. While in the Country, I was, myself, an Eye-Witness of a Case attended with most tragical Consequences: A Gentleman very

modest in his Behaviour, being in Company with some Ladies, and unwilling to give any Disturbance, by going out, violently restrain'd the Sphincter Muscle of the Bladder from it's Office, when Nature loudly call'd for a Discharge of the Urine: He, being uneasie, retir'd as soon as conveniently he might; but in the Evening was seiz'd with such a total Suppression, that I believe all the Remedies in the Globe would not have reliev'd him.

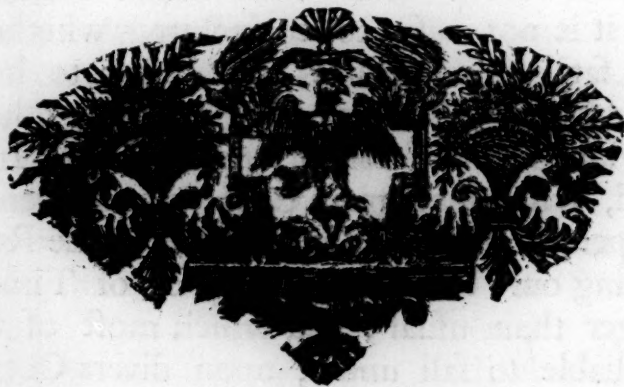
FOR, I take it, that the Cause of this Suppression was occasioned from an over great Distension of the Muscular Coat of the Bladder, above what it's Fibres could restore: so that, from this over-great Distension, the Fibres of the muscular Coat were become almost palsical, being unable to contract themselves with a Force sufficient to discharge the contain'd Fluids; for the Resistance of the Sphincter Muscle might easily have been over-come by the Catheter, if the Fibres of the Bladder could have maintained any the least Action in order to discharge the Water. However he continued languishing, under great Misery for full 13 Days, and receiv'd no Mitigation of his Dolor, till the welcome Stroke of Death reliev'd him of all his Miseries. Now if a total Suppression, but
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for a little space of Time, could produce such fatal Consequences, we have great Reason to fear, that a partial Evacuation will not happen, without it's particular Inconveniencies.

SUCH another Case relates Dr *Baynard*, in his History of the Cold Bath, *Part II. Page 350.* It is of a young Lady invited to her Sister's Labour, who riding behind a Man-servant, and wanting to make Water, her over-bashful Temper prevail'd with her to restrain her Urine, so long, that the Consequence of that Suppression, cost the Lady her Life.

BUT from this Gentleman's Relation, it is not easie to conjecture, whether this fatal Consequence was owing to her with-holding her Urine, or to some other previous Indisposition of the Bladder. Indeed, when such great Changes and Events happen, from such slight Causes as the Retaining our Urine a little space of Time, longer than usual; and which most of us are liable to fall under, upon divers Occasions, in the different Periods of Life, I am always Inclined to suspect a previous Indisposition of the Urinary Organs, as the assisting Cause of such a fatal Suppression.

WE seem to receive a sort of Notice when to Urine, which arises from either a Fulness of the Bladder, or from the pungent Salts of the contained Fluid stimulating the circular Nerves of the Sphincter Muscle to an Excretion or Discharge: And this Fulness, Stimulation, or Pungency, is a Direction, to remind us of our Duty, that we may unload the Bladder from it's Pressure, before it is so full as to be incommoded in it's Action,





C H A P. III.

Of Experiments to discover the constituent Principles of Gravel and Stone, and the Manner of their Formation in both Kidneys and Bladder, with Reasons demonstrating that Salts are the Basis of all Stones, and the Efficient Cause of their Concretion.

BUT, before we proceed to enquire into the Nature, and Constituent Principles of these petrified Concrets, I must a little entreat the Reader's Patience, while I take Notice of some external, obvious Qualities of Gravel and Stones, that relate to their natural Figures, their different Surfaces, Colours, and Textures : All which Properties, as they are manifestly discoverable by the bare Inspection of the naked Eye ; so I thought it a Subject proper to engage upon, before I proceed to dive into their internal Texture, analyze their Substance ; and attempt to discover
their

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their Constituent Principles, and the Reasons and Grounds of their Concretion.

EVERY Body conversant in the Laws of Matter and Motion; and that have Opportunities of visiting Persons subject to the Stone and Gravel, must be sensible, that there are great Varieties of Stones taken out of human Bodies; and that those of the Kidnies, for the generality, are of a much more soft, spungy, and friable Nature than those of the Bladder: And the Reason of this is, because those of the Kidnies, for the most Part, are form'd from a juxta Position of Parts, and in Organs nearer the Center of Heat; where the Motions are more active, and consequently capable of keeping the Salts and Earthy Parts more divided; in which Cases if they do happen to come together, and unite in Contact, it is with such a small Force, as to give their Parts but a very slight Cohesion; and this of Consequence renders them of a looser Texture, more friable in their Nature; whereby they are much easier dissolvable by proper Medicines, than those generated in the Bladder: So that, most commonly, those little Stones, that come from the Kidneys, may be ground to dust with the Nail of your Thumb,

as easily, almost, as you can crack a Loufe.

THOSE Stones generated in the Kidnies, are of all Shapes, Sizes; and Figures; for I have observ'd them round, oblong, spiral, angular, and conical. I once had the View of a Stone which pass'd from the left Kidney, perfectly shaped and knotted like a Mulberry, with a flinty Knob adjoining to one Side, and which jutt'd out in semblance of a Cock's Spur. A Stone thus dreadfully arm'd, longer than a Horse-Bean, and pretty near of the same Dimensions in Thickness, could not be expected to pass without great Pain and Torture; yet the Patient, who discharg'd it, assured me, it gave him much less Pain, than he could reasonably expect from it's irregular Figure.

THAT ingenious and accurate Anatomist Dr *Nichols*, in his late Lecture upon the Urinary Organs, at Surgeon's-Hall, amongst his other Preparations, expos'd a Stone, subsisting in the Kidney, to prove, that these Concretions, in the Kidnies, are form'd laminatim, as those in the Bladder: But, with all due Deference to the Sentiments of that learned Gentleman; though this was a Circumstance, that proves the Fact, and consequently, that Stones sometimes

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sometimes are found form'd in this manner ; yet far the greater Number, that have come under my Inspection, appeared to be join'd by a juxta Position of Parts ; which Parts it was not possible to separate Laminatim : Nor, indeed, can I recollect, during the Course of my Practice, ever to have seen such an Instance before, among all the Variety of Stones that have fallen under my Inspection.

IN the Bladder, indeed, most Stones are form'd from little thin Coats, or Plates investing each other ; and which are closely affix'd to the Nucleus, and to each other by the Principle of Attraction, as will manifestly appear, when we come to treat of the Generation of Stones in the Bladder. These Stones generated in this Organ are generally either Oblong, Pyri-form, or Ovicular, seldom round, or of a globose Figure.

THUS far of the different Shapes, Figures, and external Contexture of Stones, concreted in either Kidneys or Bladder ; I shall now proceed to give the Reader a View of the Experiments I have made by Analyzing of these Concrets ; whereby we shall clearly discover the Principles of Stones and Gravel ; and the Manner how they are form'd in the foregoing Organs.

EXPERIMENT

EXPERIMENT I.

A Gentleman, for divers Years, had been subject to make large Quantities of red Sand and Gravel; and therefore was under strong Apprehensions of the Stone; tho' he seldom suffered any Disturbance, unless in the Spring and Fall of the Leaf: At these Times a grinding Pain would slightly affect him, now and then, about the small of his Back, which, would always leave him, after he, at divers Times, had discharg'd great Quantities of red Gravel. I took about half an Ounce of this red Gravel and Sand, and reduced it into an impalpable Powder. This Powder I dissolv'd in a small Quantity of hot, boiling Water: After well stirring of it, and letting it stand till cold, we could not discover the least Traces of a ChrySTALLIZATION: We then boil'd it till two thirds of the fluid Parts were evaporated, and then set it in a proper Place to cool; and a little after discovered a small Quantity of shining, bright, saline Specks, which adher'd to the Sides of the Bason, just under the Surface of the Water; but not in a Quantity sufficient to discover the
Figures

Figures of their Chrystals; From this Experiment I draw this natural Conclusion: That as Salt is the Cementing Principle of Stones, as will appear hereafter; and as red Gravel contains the least Quantity of Salts, as appears from this Experiment; so is it scarce possible to conceive, that red Gravel or Sand can ever concrete into a Stone: And consequently those Persons, that Discharge a Urine saturated with Plenty of red Gravel or Sand, have little reason to fear, from this Quarter, because of the Defect of the Concreting Cause, *viz.* A due Proportion of Salts to assist the Cohesion of the gravelly Corpuscles.

EXPERIMENT II.

I took half an Ounce of little Stones, Gravel, and other fabulous Matter, that a Gentleman, in the Course of several Years, had voided with his Urine, and kept in little Boxes to view at his Leasure. These little Stones, and Gravel, were pale in Colour, most of which came from the Kidnies, as appear'd from their being only cemented by a juxta Position of Parts. This calculous Matter and Gravel I reduced, as the former, into an impalpable Powder,

Powder, and dissolved it in a small Quantity of hot, boiling Water : After the Mixture had been well stirred ; and suffered to subside, settle, and cool, I gathered half a Dram of saline Matter, that had shot into Chrystals about the Sides of the Bason. Having evaporated the fluid Parts, I put the Remainder into a Crucible, and with an intense Fire, I forced away the Volatile Parts, which, in their Ascent, were very offensive to the Smell. Having increased the Fire till the Crucible was red Hot, I, after some Time, poured it out ; and it weighed one Dram, two Scruples, and fourteen Grains. This we dissolv'd in warm Water, and filtered it through the finest, and closest Cap-Paper ; and in the Filter we found half a Dram of an ash-coloured, insipid Earth, that made scarce any Impression upon the Tongue. The filtered Liquor I recoagulated by Evaporation, and gain'd one Dram of a saline Matter. This we put into the Crucible, and urged it with an intense Fire, as at the first Tryal, but no sensible Appearance of Fumes ensued, tho' the Smell was offensive enough. After some Time, we took out the Salt, which weighed 3 ii and 7 Grains. This I dissolved in warm Water, and filtered as before ; and

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in the Filter, when dry, we took off one Scruple and five Grains of an insipid Earth, that would not dissolve in Water. The several separated Earths we attempted to reduce into a solid Concrete, first with warm Water, and then with the Addition of a little Jelly of Hart's-Horn; but no Power of ours could bring their Corpuscles to Cohere, for want of a due Quantity of Salts to support their Cohesions.

THIS Experiment clearly discovers, that the Concreting Cause is in the Salts, and that these pale, gravelly Corpuscles that contain much saline Parts, easily concrete into Stones; while red Gravel, which reflects the fewest Rays of Light, and consequently contains the fewest saline Corpuscles, is not so easily susceptible of Concretion. This likewise discovers, that the Strength of the several Organs, so breaks the Angles of the Salts, as to change many of their Corpuscles into a mere, insipid Earth; and consequently sometimes prevents their Concreting in Bodies, even, where there is a Disposition favouring the Affection of Gravel and Stone; for mere, insipid Earth, is of so brittle a Nature, that it never can Concrete so, as to form a Stone, without a
Portion

Portion of saline Matter to support it's Cohesions.

T H U S far, in Examination of Gravel and little Stones generated in the Kidnies: I shall now proceed to make the Experiments necessary to discover the Principles of Stones generated in the Bladder. If we Analyze, or resolve into Principles, a Calculus taken out of the human Bladder, we generally find the Basis of it to consist of a fixed Earth and Salt, that will endure the strongest Fire. This Experiment I have a great many Times made; and for the most Part found a great Proportion of fix'd Salt: Though I must confess, not always in equal Quantities; so that Dr *Lister* is greatly mistaken, in supposing these Concretes to have a nearer Resemblance to the Nature of Bones, than the Solidity, Densness, and Hardness of Stones; because, according to Hydrostatic, Laws they are Specifically lighter than the Standard of those Concretes, that, from their Gravity, come under the Denomination of Stones: Yet upon the strictest Enquiry, into the Nature of these petrified Concretes, extracted from the Bladder, I have observ'd several of them, that, Bulk for Bulk, have come very near the Standard of Flints: This, I say, when,

immediately, upon Extraction, they have been ballanced, in order to make the Trial; for, I am very sensible, that the Stone loses considerably of it's Weight, after it is taken out of the Bladder, and daily expos'd to the Air. And the Reason of this Change is manifest, and arises from hence; that the Acid Spirits, continually floating in the Atmosphere, dissolve into a Deliquium the loose Salts, that were not well attach'd to it in the Bladder, which renders it full of Pores and hollow Vacuities: Into these the Air insinuates, and, by Degrees, so far consumes it's internal Texture, as, in Length of Time, to reduce it to the perfect Nature of a Pumice Stone.

I HAD the sight of one, that, when taken out of the Bladder, according to report, weighed full nine Ounces; and at the Time I saw it, which was above 15 Years after, did not exceed one Ounce one Dram and half, and 12 Grains; but I am apprehensive that some Parts of it, in the Course of so long a Time, had been broken off, and lost. However the Reason of this Difference will be confirmed from the following Experiment made with a Stone taken out of the Bladder of Colonel *White*,
Governour

Governour of the Tower, under *Oliver Cromwel.* It weigh'd, on the 4th of *December*, 1732, one Ounce six Drams and eighteen Grains, and it cannot be less than 50 Years since he died.

INDEED, there are two Ways of resolving of Stones, concreted in the Bladder, in order to discover their Constituent Principles: The first concerns the unraveling of their external Texture Laminatim, or in the same manner they are generated: And this is done with a sharp pointed Instrument, that separates every single Coat, from that which lies next immediately under it: The other is discovered by a Resolution of the Stone into it's Principles, whereby we acquire a Knowledge of the Materials it is composed of. I made the following Experiment with Colonel *White's* Stone, in order to discover the Manner, how Stones Concrete in the Bladder.

EXPERIMENT III.

THE foregoing Stone, taken out of the Bladder of Colonel *White*, was oblong in Figure, inclining to be flat in it's Surface. It's Dimensions lengthways, measured full 7 Inches, round over 6 one
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Quarter,

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Quarter. This Stone I took, and with a sharp pointed Instrument, separated it's Coats in the best Manner I could. The 6 or 7 outer Integuments consisted of chalky Incrustations, that made the same Impression upon board or Stone that Chalk generally makes. As I approach'd the Nucleus, the Coats or Laminæ were darker in Colour, and of divers thickneses. The Nucleus adhered very slightly to the immediate investing Coat; and was much softer than any other Parts of the Stone: So that, as soon as we attempted any farther Resolution, it all broke to Pieces, and very easily crumbled into a dark Sand, or gravelly Matter. However, had not this Accident happened, I did not perceive, in any of the Pieces, the least Trace of a Coat, or a Disposition to any farther Separations; but all the Nucleus appeared form'd from a juxta Position of Parts, very irregularly put together.

In the Progress, of this Experiment, I discovered, that the several investing Coats were thickest and hardest to separate near the Surface which most commonly terminated, in a kind of Segment on that Side, that bore oftenest upon the Bottom, or Sides of the Bladder. The Nucleus did not lye, strictly speaking, in the Center of the
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the Stone ; but rather bore to that Side of it, whose Surface touched the Bladder, and hindered the Corpuscles from Concreting.

THUS, tracing the Stone from it's Circumference to it's Center, I discovered, that the external Laminæ consisted of white cretacious Matter ; and consequently that the Gentleman, towards the latter Period of his Life, was subject to Fits of the Gout : The Salts and earthy Matter occasioning these Fits, as Nature began to decline, left their old Tracts, and were arrested by the Kidneys, and convey'd by the Ureters to the Bladder, where, in the Course of Time, they form'd several Coats, which investing the Stone, greatly added to it's Bulk, and consequently to the Pain and Pressure of the succeeding Paroxysms.

WE took the separated Parts, and reduced them into a very fine Powder ; and made a Solution in hot, boiling Water, and afterwards set it to cool ; but the Chrystals did not shoot as in the former Experiments ; for we had not above two Scruples, in above 14 Drams of the Stone. Then we evaporated the fluid Parts, and put the Residue into a Crucible, increasing the Fire, till it was red hot : After some

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time

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time we poured out the fabulous Matter, and found 6 Drams and 2 Scruples of an Alkaline fix'd Salt, that was very hot upon the Tongue. This Salt we dissolved in warm Water, and filter'd the Solution: After the Filter was dry, we took off one Dram, two Scruples, and 14 Grains of an extremely light, insipid Earth, that would not dissolve in Water: We then attempted to reduce it to a Concrete, but no Art of ours could get the Corpuscles to Cohere, but like Spanish White, they would immediately separate, and fall asunder again.

It appears by this Experiment, that much of the essential Salt, that, in other Stones are observed to shoot into Chrystals, had been destroyed, by the Length of Time since, it had been taken out of the Bladder. In short I have made divers Experiments with Stones taken out of the human Bladder, and ever found a very great Proportion of Salts; and that where there were fewest, there the Stone was softest, of a spongy Nature, and would break or crumble to Pieces with the least Force.

By these Analyzations and Experiments we discover, that all Stones and Gravel generated in Kidneys and Bladder, consist of Salts, and the Corpuscles of an earthy

earthy Substance united : But as these Salts are the most active Principle, in generating these petrified Concretes, so I shall here beg leave, to discourse a little upon the Nature and Texture of their constituent Parts ; as these Points will serve to illustrate divers particulars, I shall be obliged to Treat of in the following Chapters.

I QUESTION whether Salts are ever generated. I take them to be derived from the Sea, the common Store-House of all saline Substances. Every Particle of Salt therefore is a compound Body, consisting of a dry, earthy, Substance, which is the Center of the saline Body, and an acid, coagulated Fluid, which, on every Side, encompasses it ; and is retained, and held fast, by the Central Attraction of the dry, earthy Corpuscle. Now if it were not for the Central Attraction of the earthy Corpuscle, the watry Acid would not concrete, but dissolve, liquefie, and constitute a Fluid ; and consequently all Salts would be in a State of Fluidity ; and on the contrary, if there were no watry Acid, the Corpuscles of Salt would not be dissolveable by the Moisture of the Tongue, nor act upon the Organ

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Organ of Taste, in that sensible manner, they are known to do.

To support this Position, we are to consider, that all Separations of common Marine Salt, only depend upon separating the Fluid, in which it is dissolved, by the Application of a proper Degree of Fire, and the Work is done: And if we proceed to consider the Salts of Vegetables, we shall perceive, that they consist of the same marine, saline Substance, more digested and volatiliz'd in their Mixture with the Juices of Herbs and Fruits: And these Salts, so visibly discoverable in the Blood and Urine of Animals, are only the same Salts still more intimately digested and volatilized by their feeding upon these Vegetables; and which, the Force of their Solids are capable of extracting, by dividing their Parts into the minutest Corpuscles they are capable of arriving at. So that these saline Substances we abound with, and our Blood affords upon divers Experiments, are only a Portion of the Matter of the Universe, existing in the Sea, percolated through the Earth, transmitted into Vegetables, digested into Animals, and ultimately carnified in ourselves.

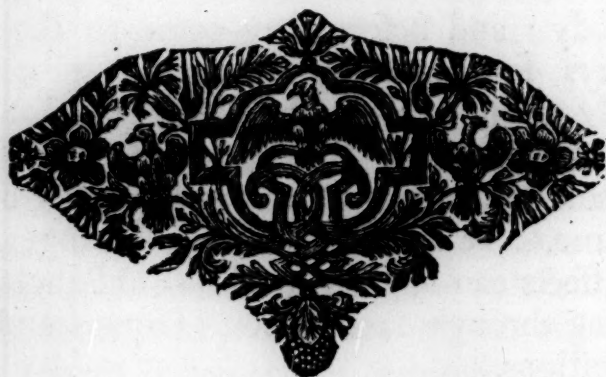
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AND hence it appears, that the difference between Stones generated in the Organs of the Kidneys and Bladder; and those concreted in the Bowels of the Earth, can only arise from the different Degrees of Digestion in the saline Matter: That the Bulk of the former is concreted from softer and lighter Salts; their natural Gravity being very much lessened, by the several Digestions they undergo in the Earth, before they come into our Aliments; before these Aliments are prepared for our Food; before they are digested by the Force of the Stomach, and other Organs of the Body; and before they come to the Kidneys for Secretion: So that it necessarily follows, that the Matter of Stones extracted from the Body of Man, and those taken out of the Earth must be the same, save what Alterations, Changes, and Effects can happen to saline Substances passing through such various Organs and Digestions.

IT is therefore the Salts, in Animal Bodies, that give to Flesh Meats that delicate, fine Relish, and Flavour, that make them so desirable above all other Aliments of the Vegetable Tribe; and which, when heightened with artificial Refinements,

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ments, and crouded into our Bodies in too great Quantities, prove the Occasion of Numbers of Diseases; and of none sooner then the Stone and Gravel, if there be a Disposition favouring these Affections: And what that Disposition is, we shall proceed to examine in the following Chapter.



C H A P.



CHAP. IV.

Of the predisposing Cause of Gravel and Stone; and the Reason why these petrified Concretes are generated in divers Organs of the Body.

BUT before I proceed to examine into the Modus of Attraction necessary to produce Gravel and Stones, in either Kidneys or Bladder, I think it will not be a needless Digression, if I so far trespass upon the Reader's Patience, as to examine into the Nature of their Generation, in general, and the Laws by which these petrified Concretes are produced, in divers Parts of human Bodies.

AND, that there are Gravel and Stones concremented, in several Parts of the Body, besides the Kidneys and Bladder, we have the constant Attestations of the most eminent

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nent Masters of Physic ; who declare to us, that they have known Stones taken out of the Brain, Lungs, Heart, Liver, Gall-Bladder, &c.

THUS *Ætius* asserts, That he saw a Stone taken out of the Eye-lids : And *Holleriusæ*, in his first Book of Diseases of the Head, and I think about the 45th Chapter, reports a Case, in which Stones were discovered in the Brain. *Florentinus* relates such another Case of a Stone taken out under the Tongue. Sir *Edmund King* speaks of a Stone taken out of the Glandula Pinealis. Mr *Charles Kirkby* treats of Stones taken out of the Lungs of a Boy near *Dantzick* : And Experience daily assures us, that Stones are found in the Gall-Bladder of several Animals, but especially in Man. I was present at the Opening of a Person that died of the Yellow-Jaundice, and in his Gall-Bladder was found a Stone bigger than a Walnut, of a darkish Green, inclining to a black Colour : And *Fernelius* acquaints us with the Story of an old Man, that being opened, after he was dead, had neither Gall nor Bladder, but in it's Place a great Stone in a Capsule : And it's credibly reported of *George, King of Bohemia*, that his Gall was found converted into a red Stone.

Paræus

Paræus relates, that he took a Stone out of a Man's knee. *Paulus Ægynæta* found some in the Nerves, and calls them *Nodose Nervorum Concretiones*, or gouty Stones of the Nerves. Mr *Tolet*, Lythotomist of the Hospital in *Paris*, speaks of a Man that had a Stone of the Bigness of an Olive Stone, came out of his Navel; and the Man was living 20 Years after.

THUS far, as to the Facts, which many of these Gentlemen aver they were Eye-Witnesses of. The next Point that comes in Question, is to discover how they came there; Now it most evidently appears, that, in all these several Cases, no Gravel or Stony Concretions could lodge themselves upon any of the foregoing Parts, were not the Motion of the Fluids, circulating through these Parts, slower than is consistent with their Natural Standard. This Slowness of Motion, in the Fluids, is the Cause why the saline Corpuscles attract each other, and the earthy Parts of the Blood with them: For the Attraction of all saline Corpuscles, is in Proportion to the Slowness of their Motion, in the Fluids they are dissolved.

THE Foundation of all Stones, Gravel, and fabulous Concretions, therefore, must depend upon the Slowness of Motion
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in the Animal Fluids; and that Slowness of Motion, upon the impair'd Tone and Action of the Animal Organs: For the largest Quantity of Salts, or earthy concreting Matter generated in the Blood, and circulating with the Fluids, could never make any Lodgement in the Cavities of any of the Organs, were but all the Parts equally Strong; for then all the Parts would of Necessity equally exert their mechanical Springs to expel these Salts, and hinder any earthy Matter, in Conjunction with these Salts, from concreting, in any of the Organs; that is, the several Motions, Separations, and Secretions, of different Fluids, in the several Parts, would be so Mathematically exact, or tending so nearly to a Mathematical Exactness, as to be able to disloge any the least Corpuscle of Salt, or earthy Matter, that should attempt to make a Lodgement upon the Organs of the Brain, Lungs, Heart, or Liver; and consequently there could be no Stone generated in any of these Parts.

WHAT I mean therefore by the Predisposing Cause is, that Indisposition, in the Fibres of the several Organs, whereby they are rendered incapable of performing their natural Functions. And this I call the Predisposing Cause, in Contradistinction to all other Causes; and as it is the first
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and original Cause of all the Alterations, and Changes, that ensue in the several Organs of the Animal Machine: So that it is the Cause, without which, no other of the subordinate Causes can act; and consequently neither Gravel nor Stones be generated in either Kidneys or Bladder; and much less in any of the other Organs, nearer the Center of Motion, which is the Heart.

WERE it not therefore for a preternatural Weakness, in these Organs; or did not the Fibres, that compose these Organs, recede from their natural Tone and Elasticity, it's impossible, in the Nature of Things, to conceive, that the Motions of the Juices could ever be retarded, or that any of the more remote Causes could ever dispose these Juices to a Change: For while all the Springs of the Animal Constitution, continue equally strong, all the Springs of the Animal Constitution will be equally capable of making Resistance to the Invasion of the Causes; and consequently of discharging these Causes thro' some of the proper Out-lets of Nature.

AND I lay it down, as a Maxim most certainly true, in Relation to the Constitution of human Bodies; That in all Cases, where the Motions of the Solids and Fluids

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are agreeable to the Course of Nature, there the Secretions will be natural, and consequently the Discharges, by the several Evacuations, regular.

It necessarily follows therefore ; that it is impossible these Motions, Secretions and Discharges could ever be irregular ; impossible, that any Disease could ever invade the Constitution of the Animal Organs ; impossible, in the Nature of Things, that the Non-naturals themselves, the efficient Cause of all Diseases, could ever embarrass the Constitution of the Animal Fabrick, were not some Parts of our Bodies weaker than others ; and consequently less capable of making Resistance to the Motions of the same Fluids, as they come to the several secrening Canals for Secretion.

So that neither the Air, our Diet, nor any other of the Non-naturals could vitiate the Blood, or retard it's Secretion in the Urinary Passages, so as to generate these preternatural Concretes, were there not a Disposition of the Parts favouring their Concretion : For let a Man swallow, eat, and drink, as much, and as often as he pleases of the most delicious, poignant Aliments ; yet if the Constitution be but strong enough, in every Organ, to exert
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it's mechanical Springs, to fling off the Load, by their proper Discharges, no Damage can ensue to the Body. This, I think, is a Fact, so plain, obvious, and demonstrative, from every Day's Experience; and from the Practice of Thousands, that are no ways incommoded with the least Symptoms of Gravel and Stone, though they are continually Swilling into the Habit, variety of the most delicious Viands, that I need not enlarge any farther upon Proof.

BUT on the contrary, if the Fibres of any Part happen to be affected, or relaxed; then the Fluids that circulate thro' that Part, will be impair'd in their Motions, and this impairment in the Motions of the Fluids, must necessarily occasion an Obstruction in the Cavity of the Tubes, or Hollow of the Fibers, which will consequently put that Part to Pain, by creating a greater Tension upon that Part, than is consistent with it's natural Tone and Structure. This Weakness of the Organ; and these Consequent Symptoms of Tension, and Pain, that thus necessarily happen upon the Fibres of any Part losing their natural Elasticity and Tone, is that Indisposition which I call the *predisposing Cause* of a Disease.

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How the several Organs come, to be thus primarily dispos'd to a Disease; that is, how the Kidneys and Bladder come to be thus dispos'd to generate Stones and Gravel, will be a Point most worthy our Enquiry. Now this Disposition favouring the Generation of Stones and Gravel, in any Part of the Body, but more particularly in the Kidneys and Bladder, must either be Hereditary, or contracted in the Course of Time. If Hereditary, then it arises from the Mala Stamina, that the Patient received from his Parents, in the first Rudiments of Life; for Children are as well Heirs of their Father's Diseases, as of their Estates. Nay, the Poet very elegantly contends, that even the Virtues or Vices of Parents are transmitted into their Children.

*Et Patrum in Natos abeunt cum semine
Mores.*

AND the early Appearance of the Stone, in many Children, obliges me to conclude, that the Rudiments of these Concretes were existing in the Bladder, long before; and that it is highly probable, they brought them into the World with them; for

several have been Cut for the Stone, by that Time, they were 4 Years of Age.

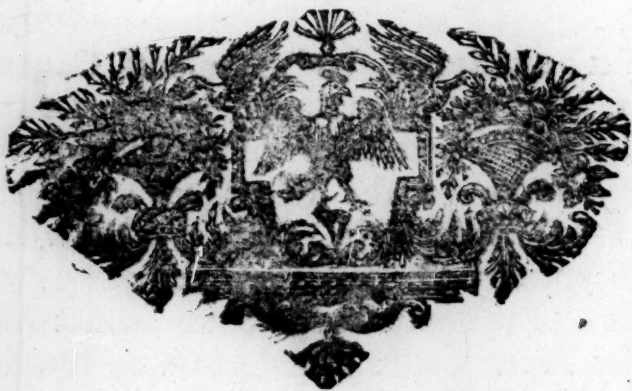
HOWEVER, to relieve this Disorder, when it arises from a Hereditary Indisposition, is above the Power of Medicine to effect; for in this Case nothing can give him a permanent Relief, but the dextrous Hand of some skilful Lithotomist.

IF it be acquired in Time, it must arise from either Strains, Wrenches, or an Error in some of the Non-naturals, that, by some Means, impair the Tone and Action of the Kidneys or Bladder: And in all these Cases we shall easily discover, how the consequential Causes Act upon these Organs, thus pre-disposed for their Reception.

THOSE Stones and fabulous Concretions, that are often found in the Lungs, in the Brain, and divers other Parts of the Body, must be the Consequence of the depraved Motions in those Parts, where those gravelly Concretes are seated. And hence the Corpuscles of Salts attract the earthy Parts of the Blood; and both unite in forming Gravel and Stones of divers Magnitudes according to the different Magnitude, of the Cavity of the Organ in which they are lodg'd. If a Stone possess the Lungs, there assuredly follows a Vo-

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mica, or Phthifis, which is not cured unless the Stone be forced from it's Lodgment. And, in all Parts, they occasion great Uneasiness, Pain, and Decays of the Body: And hence often arise Consumptions of the whole Habit, without any evident Cause; and which sometimes kill the Patient, notwithstanding all the Discharges, in seeming Appearance, are regular; This we call an Attrophy, wherein the Muscular Parts all equally Decay, without the least Taint of the Lungs.



CHAP.



C H A P. V.

Of the Generation of Sand, Gravel, and Stones in the Kidneys; and the Modus of Attraction necessary to produce these Concretes in the foregoing Organs.

HITHERTO we have considered these Laws, by which Stones are generated in divers Parts of the Body, according as these Parts are originally weaker than the rest; or become so by vitious Habits contracted in Time: But as I design professedly to treat of the Stone and Gravel, only so far as these petrified Concretes affect the Kidneys and Bladder; so I shall confine the Remainder of this Discourse to these Subjects only that concern their immediate Concretion.

MOST of these Authors, that have engaged upon the Subjects of Gravel and Stone, have attempted to derive the Cause of their Concretion, from the Principles of Philosophy, most generally received in the Times they lived. They were very well apprized, that as the Animal Machine was a Part of the Creation, so it's natural Motions, and the Effects resulting from these Motions, could not so properly be explained by any other Laws, as those that support the Motions of this visible System of the Universe. But as their Principles were extremely defective, so were the Authors seldom capable of erecting a consistent System, that would bear the severe Test of a strict Enquiry; or indeed that was consonant to the Phænomena of Nature, or the Reason of Things.

BUT as the great Sir *Isaak Newton*, that Ornament of the *English* Nation, has, with a most surprizing Success, attempted to establish the several Appearances of Nature, upon the most simple Principles of Attraction, Motion, and Division; and as these Principles seem perfectly capable of solving every particular Phænomenon, that falls under our Inspection; so I shall proceed upon these Principles,

Principles, in order to Discover the immediate Cause and Generation of all Gravel, Stones, and fabulous Concretions, that affect either Kidneys, or Bladder.

WE demonstrated from divers Facts and Experiments, explain'd in the Third Chapter of this Work, that saline Substances are the most active Principles of the Stone; we have also farther demonstrated, from the same Experiments, that all Salts have a very strong attractive Power, whereby their Corpuscles are more strongly attracted to each other, than to the watery Menstruum, in which they are dissolved: It will appear demonstrable, from the following Experiment, that all saline Corpuscles, are endued, not only with a Principle of Attraction whereby they tend to each other; but with a Power to attract every other Corpuscle of Matter, not Saline, that comes within the Sphere of their Activity.

To prove this Point, you need only reduce a Quantity of Gravel into an impalpable Powder, and dissolve it in warm Water; after it is diffused through the aqueous Menstruum, the saline Parts will emerge, and separate from the earthy Corpuscles, upon which you will perceive it to taste very brackish; which is a clear Indication, that every gravelly Corpuscle,
though

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though ever so minute, has a saline Corpuscle for it's Center, or else whence this saline Taste : For if you Levigate the Gravel ever so fine, it will not make the least Impression upon the Tongue : All you taste, in this Case, is only an insipid, simple Earth ; so that every Corpuscle of Gravel is only a Corpuscle of Salt, incruited with a thin Plate, or Stratum of fine Earth : And this is the simplest Experiment, both to discover the Nature of Gravel, and the Manner of it's Concretion.

THESE Experiments mention'd both by *Leeuwenhook*, and our Country Man Dr *Musgrave*, of Calcinations made upon the Lime Stone, Gout Stone. and a Stone taken out of the Bladder, in order to discover their Similitude of Substance, do by no Means prove the genuine Principles of these Concretes ; for the Force of Fire employ'd in these Experiments, does so sharpen the Points and Edges of their Salts, over and above what Nature form'd them, as to render them little less corrosive, than the most burning Caustick.

THIS is not to make Experiments to discover the genuine Principles, that Bodies consist of ; but to give new Principles, or at least so far to change the old Substance

stance of the Concrete, as to oblige it to produce Effects greatly different, from those it's genuine Principles would afford us, upon proper Tryals.

I CONFESS, with a great deal of real Concern, that I was led into Mistakes very considerable, in both the first and second Editions of this Work, by adhering too strictly to the foregoing Experiments of *Leeuwenhook*, and Asserting upon these Grounds, that these fix'd Salts were existing in the Body, in the same manner they come from the Fire; and that the Painfulness of the Symptoms, under the Nephritick Paroxysm, was more owing to the Degrees of Fixity in the Salts; the Sharpness of their Points and Edges; than to the Force and Motion of the Stone.

Now, if the Cause of a Fit did depend upon the Figures of the Salts, or their Fixity, and not upon the Motion of the Stone; then the Fits would be permanent, and never cease, so long as the Gravel or Stone did exist in the Kidneys; because the same Causes, always existing, must continually produce the same Effects: but, since we find, that People subject to these Disorders, have Intervals of Ease, longer or shorter, in Proportion to the different Disposition of the Patient;
and

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and Degrees of the Causes acting, it must necessarily follow, that the Severity of these Fits, and the Frequency of their Return will more depend upon the Motion of the Gravel or Stone, and the Force with which they affect the tender Fibres of the Kidneys, than upon the Figures of any Corpuscles that compose these Concretes.

HITHERTO, we have considered the Nature and Principles of Gravel and little Stones, in the Kidneys and Bladder; I shall now proceed to treat of their Generation, and the Manner how these petrified Concretes are bred in the Substance of the foregoing Organs: and though in most of my other Writings, I have reasoned, from the Effects of Diseases, to their Causes; yet in this Case, I must beg leave to invert that Course, and trace out the Effects from their Causes; that is, discover the Symptoms from the Gravel and Stone, that occasion the Disease.

AND tho' some have supposed the other Way a more natural Method of investigating the Nature of Diseases, yet that only happens where the Effects are visible, and the Causes lye more deeply concealed from our Knowledge: But I am perswaded, where we have a perfect Knowledge of
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the Causes, as we certainly have in all Cases of the Stone and Gravel, there, to proceed upon the Causes, before their Symptoms or Effects, will be the most natural Way of treating Diseases ; because it is treating of the Generals before Particulars, a Method which all the great Ancients ever observed in their Writings.

HOWEVER, in both, it is necessary that the Author have a consummate Knowledge ; and that he do not only perfectly understand the Nature of these Subjects in general, but that he also be able to dive into all the particular Branches ; and give his Reader a clear Idea of the several Causes of Gravel and Stone, and the Reason of their Existence : And I lay it down as a self-evident Proposition : That if ever there was a Time when the Urinary Passages were perfectly free from the Embarrassments of Gravel and Stone, then it is certain, there must be a Period of Time, when these Concretes first began to infest these Organs, and the Question is, how they came there ; for if the saline Corpuscles of our Food be well digested in the Stomach, and broken into their Minima, by the Force of the Heart and Arteries, as they circulate with the Blood ; then they will be more strongly attracted
by

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by the Serum of the Blood, than by each other ; and consequently no Separations can happen, from Salts thus minutely digested for the Generation of Gravel ; but, in these Cases, they will peaceably flow to the Kidneys, be fecerned with the Urine, descend into the Bladder ; and be discharged the Body, without the least Lett or Molestation : Some Change therefore must necessarily ensue in the Materials of the Urine, before any Gravel can be generated, and how this is effected, I shall now proceed to consider.

A WEAKNESS in the digestive Powers of the Stomach, is certainly the first and original Cause of all Gravel, Sand, and fabulous Concretions generated in the Kidneys ; for, by this means, the Salts of our Aliments, escape a thorough Digestion in the Stomach ; which coming into the Blood, and being driven with the Fluids, by the Force of the Heart and Arteries, into the Kidneys, are, from the Largeness of their Surfaces and Dimensions, entangled in the secretory Strainers of these Organs.

AND as all gravelly Corpuscles were originally in a fluid State ; and are only the Salts and earthy Parts of our Aliments dissolved in the Serum of the Blood ; so we are to consider, that they will necessarily
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take the same Fate with the Fluids, and move swifter or slower in Proportion, as the Fluids alter their Degrees of Motion, from the Impelling Causes, that is, from the Force of the Heart and Arteries. And if it so happen, that these Arteries are any way impaired in their Springs, especially near the Kidneys, then the Fluids will move slower, and of Consequence the saline Corpuscles, from the Largeness of their Bulks and Dimensions, will attract the earthy Parts, and form Sand or Gravel in the Kidneys: So that these little small Concretions, that frequently come away from People dispos'd to Stone or Gravel, are nothing but Particles of Earth, which the Serum of the Blood, parts with, in it's Separations by the Kidneys; and which have a Corpuscle of Salt for their Center. And I am inclineable to believe, that these earthy Corpuscles are only the foregoing Salts, that, in their various Occursions, Conflicts, and Motions, have lost their Points and Edges, whereby they are liable to be attracted by the saline Corpuscles, as they come to the Kidneys for Secretion. If these earthy Parts, attracted by the saline Corpuscles, be extremely light and little, then there ensues the Generation of a very light Sand.

Now

NOW, if Numbers of these light, sandy Corpuscles move extremely slow in the Urinous Fluid, they will attract each other, and unite in forming Bodies of larger Surfaces and Dimensions; and these we call Gravel, whose Parts are of a looser Texture, and less cohereing with each other, than the earthy, with the saline Corpuscles; and the Reason of this Difference arises from hence; That the saline Corpuscles attract the earthy Parts of the Urine much stronger to form a Corpuscle of Sand, as these earthy Parts lye more exposed to the attractive Force of these Salts; than the same Salts concreted into Sand, attract each other, in order to form gravelly Concretions: And this is the Origine of these vast Loads of Sand and Gravel, that often croud the Urinal a considerable Time, before any Stones are generated in the Kidneys.

BUT tho' Sand and Gravel are so readily formed in the Kidneys; and though the same Principles and Causes concerned in generating these arenulous Substances, also concur in producing Stones in the Kidneys, yet it is but with great Difficulty, that these latter, petrified Concretes can be formed in the foregoing Organs, because the saline Corpuscles, in the Center
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of the gravelly Matter, lose much of that attracting Force, they were endued with, while only a saline Substance, and not encrusted with a Coat of Earth: For, after this Incrustation, a great Part of their Attractive Force, or that Power, by Virtue of which they act upon other Bodies at a small Distance, is, in a great measure, obstructed in it's Action, by it's being unable to break through the Inclosure of the encrusted Coat of Earth. And this is the Reason why many People continue, for divers Years, to void vast Quantities of Sand and Gravel from the Kidneys, without ever being molested with the Stone, or suffering the least Pain of a Fit.

Now, as the Urine is a compound Fluid; and, in those disposed to a Stone of the Kidneys, consists of fabulous Corpuscles of different Gravities; and as these Corpuscles are variously affected from the different Motions and Impulses of the renal Fibres, and their different Elasticity; so it follows, that upon the Abatement of Elasticity, in the Fibres of the foregoing Organs, the Corpuscles of the fabulous Matter will move more slowly in their Vehicle; so it follows, that upon their slower Motions, the Powers of their Attractions will be

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greatly increased towards each other ; upon which they will unite in Contact, and form a little Cluster of Gravel, that lays the Foundation of the succeeding Stone: And, thenceforward, this Cluster, being continually washed by the Urine, as it is secreted by the Kidneys, attracts divers of it's Corpuscles, that, in Time raises it to a determined Bigness ; though few of these Stones generated in the Kidneys, exceed a large Bean in Magnitude ; for by that Time they come to be of the foregoing Bigness, the Muscular Fibres of the Kidney-affected exert their mechanical Springs, and pressing it on all Sides, force it through the Carunculæ Papillares into the Pelvis, from whence it descends by the Ureters, into the Bladder.

BUT, if the Elastick Fibres of the Kidneys, happen to be greatly impaired in their Springs ; and are unable to exert their mechanical Powers, for the Expulsion of the Stone ; then, by dilating the Sinus where it lies ; and receiving continual Supplies from the Afflux of Urine, it may, in the Course of Time, encrease to an extraordinary Magnitude, even to equal a large Walnut in Bigness : Nay, in some Cases, it may wear away
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of the Gravel and Stone. 83

the greatest Part of the Kidney, and only reserve it's external Coat, as a Capsule, for it to lodge in : And *Bonetus* relates, from *Anton. de Pozzis*, that he found, in each Kidney, a Stone weighing six Ounces, without any previous Symptoms of Gravel or Stone ; only that he was attended with an insatiable Thirst, and a copious Flux of a clear, limpid Urine ; but these are Stones of a monstrous size, and not common to any Subject.

IT is very rare, as I observed above, that any Stones in the Kidneys, are bigger than a large Horse-Bean : Those no bigger than a Pea or Vetch will give most exquisite Pain, in their Passage, from the Kidneys to the Bladder, especially if they be the first Stones, that are discharged from these Organs.

AND thus we have, upon the plainest, clearest, and easiest Principles, explained the Generation of Sand, Gravel, and Stones, bred in the the Kidneys, with the Modus of Attraction necessary to produce these Concrets in the foregoing Organs : So that there is no Occasion for any viscid, cementing Lymph to glue the arenulous Atoms together, as I asserted in the former Edition of this Work, being drawn into that Error, by the Authority

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of very great Writers: For, the Law of Attraction, or Gravitation, entirely supplies that Office, which acts more or less strongly upon the Salts, and earthy Parts of Matter, as their Corpuscles are more or less minutely divided, by the digestive Powers of the Constitution; and consequently raises them into Gravel or Stones of a harder or looser Texture.



C H A P.



C H A P. VI.

Of the Generation of a Stone in the Bladder; from the Principles of the Urine contained in the Bladder: From a Nucleus formed in the Kidneys; and from Accidental Causes.

I SHALL consider the Formation of the Stone, in Relation to these three Particulars, because it is impossible to conceive, how any Stone can be generated in the Bladder, but what must either arise immediately from the Principles of Urine contained in the Bladder; from a Nucleus form'd in the Kidneys, or from accidental Causes, that is, from a foreign Body accidentally introduced into the Bladder; and so introduced, as to be the Principle of Attraction to the yet unformed Stone: And I have thought it most adviseable, to fling these several Sub-

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jects into this Light; that the Reader might more readily take a View, of the Nature and Cause of these Concretes, that so frequently disturb his Peace, and subject him to the most insulting Miseries.

Now, tho' it be a very rare Case, to discover a Stone formed in the Bladder, from a Principle of the Urine contained in the Bladder, yet I take it to be a Circumstance not absolutely impossible; for let the Urine be never so limpid, yet we are certain, that it contains many solid Corpuscles, that, by their Gravities, may separate from the watery Fluid, and, be precipitated: Any of these separated, solid Parts may prove the Ground-Work of the Stone; or the Central Point of Attraction to all the Corpuscles of lesser Gravities floating in the Urine.

IF, indeed, all the Corpuscles, that float in the Urine, were of equal specifick Gravities, then could there no separations ensue, in the Fluid contained in the Bladder: Then all the Corpuscles of this watery Fluid, being equal in their Bulks, Gravities, and Attractions, all the Corpuscles must necessarily preserve themselves at equidistant Spaces; upon which their shiftings, or changing Places, could
neither

of the Gravel and Stone. 87

neither introduce any Change of Substance in the Urine, nor consequently generate any Stone in the Bladder; so that, in this Case, as the Urine descended from the Kidneys, by the Ureters, into the Bladder equally Fluid; so would it be discharged from this Organ equally free; and without the least Stop, Lett, or Obstruction.

T H E R E must, therefore, be different Gravities in the Corpuscles, that compose this Fluid, in order to enable them to produce a Change in the Substance of the Urine; and such a Change as is capable of introducing a Stone in the Bladder.

T O be able to effect this Point, the Urine must contain solid Bodies of different Gravities, *viz.* Sand or Gravel, whose component Parts are of different Magnitudes: And that it does consist of such Parts, is discoverable from daily Experience. Now, if we admit Corpuscles of different Gravities into the Bladder, then these Corpuscles will exert their attractive Powers in Proportion to their different Magnitudes; then, the largest Corpuscles in Bulk, will exert the greatest attracting Force, amongst which, that Corpuscle of greatest Specifick Gravity, according to the Laws of Matter, and

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the Gravitation of all Bodies, will ever first be precipitated: Then, this largest, precipitated Particle of Gravel, or earthy Matter, will prove the Central Point of Attraction, to all the earthy Corpuscles contained in the Urine; and which consequently will prove the Basis of the yet unform'd Stone.

UPON these Principles, the first Ground-Work, or Center of the Stone, when it takes it's Rise in the Bladder, and is not generated from a Nucleus formed in the Kidneys, may proceed from a Particle of Matter so extremely small, as scarce to be perceived by the most curious Eye, which, receiving daily greater Bulk, from the Corpuscles of Salt and Earth, forming Strata, Laminæ, or Coats, that successively invest each other, may, in the Course of Time, if it be not speedily discharged, raise it to an extraordinary Magnitude.

AND this is the Beginning and Progress of Stones generated, in the Bladder, when they are formed from a Principle of the Urine contained in the Bladder: But as most Stones formed in the Bladder, generally take their Origine from a Nucleus generated in the Kidneys; so I shall proceed to examine their Principles,
Manner

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Manner of Formation, and Progress, from the first Admission of the Nucleus into the Bladder, till it either is discharged with the Urine, dissolved by the Force of Medicines, or arises to the greatest Magnitude.

I observed in the third Experiment of the third Chapter, where I am Attempting to discover the Texture of a Stone generated in the Bladder, by unripping the several Coats that compose it; That the Body of the Nucleus was of a Colour, Consistence, and Make widely different, from the adventitious Coats, that afterwards invest it in the Bladder. It also appears visible, from divers Experiments I have made, that the Substance of the Nucleus is of a looser Texture; and constituted of Materials more frangible in their own Nature, than the Bulk of those Stones generated in the Bladder: Besides, few Persons suffer under a Stone in the Bladder; but, if they attentively reflect, will perceive, that, some Time before, they were subject to a nephritick Paroxysm, and, that the Nucleus or Stone, then broke through the Carunculæ Papillares, and fell into the Pelvis, from whence,
it

it descended, by the Ureters, into the Bladder.

AFTER the Stone is fallen into the Bladder, if the muscular Fibres of this Organ be strong enough, to expel this new receiv'd Nucleus with the Urine, then all may do well, and the Patient at once be relieved of his future Misery; but if not, he must prepare to suffer the most dejecting Pains, that human Nature can labour under: For by it's continuance in the Bladder, it will encrease in Bulk, and an Encrease of Bulk will oblige it to press with greater Force against the Sides and Fund of the Bladder; from whence arise Inflammations, and frequent Fits, that afflict the Patient with the most distracting Pains.

AND here, I cannot but take Notice of divers Circumstances, in the Formation of Stones, in the Bladder, that no way affect those generated in the Kidneys: For in the Kidneys the Urine is continually in Motion, whereby it's solid Contents are kept more separate, and not so liable to come in Contact with each other: It is either secreting by the Urinous Tubes, or flowing into the Pelvis, or descending by the Ureters into the Bladder: In the Bladder
it

it is continually at Rest, and has very little intestine Motion, but what arises from the different Gravities of it's Corpuscles; and the different Attractions consequent thereupon: And as the Attraction of all Bodies is in Proportion to the Magnitude of the Attracting Body, and as the Nucleus in the Bladder is the largest, attracting Body; so where a Nucleus happens to gain Admission into the Bladder, there this Nucleus will necessarily prove the attracting Principle; which will thenceforward be embraced by the attracted Corpuscles, that successively invest it in the Figure of Coats or Strata.

So that a Corpuscle of Salt, is properly a Nucleus to every Particle of Gravel; and a Particle of Gravel a Nucleus to these little Stones generated in the Kidneys; and one of these little Stones generated in the Kidneys most commonly proves the Basis or a Nucleus to those larger Concretes formed in the Bladder: And thus we discover the just Proceedings of Nature, through all her different Processes, from the Origine of the least gravelly Corpuscle, to the finishing the largest Stones in the Bladder.

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BUT the Manner how these Strata, or contiguous little Shells, that invest the Nucleus, are formed from the Urine in this Organ, being a Point of very great Importance to be known; and as they differ from the Investments of most Stones generated in the Kidneys; so I shall proceed to discover the Manner of their Concretion, and how they successively attach themselves to the Nucleus, and often raise it to an extraordinary Magnitude.

I observed before, that the Urine is a compound Fluid, consisting of Salt, Earth, and an aqueous Menstruum. That the earthy Matter is only the foregoing Salts, that, in their various Motions, Occursions, and Conflicts, have lost their Points and Edges, whereby they cease to affect the Organ of Taste with a saline Impression, and consequently lose their Property of Salt. These Principles Subsisting in the Bladder are the Materials of the Stone; but how they determine their Motions, in order to invest the Nucleus with Coats for it's Increase of Bulk, is the Question.

THE learned Dr. *Pitcairn* will have it; That the Corpuscles of the greatest specifick

specifick Gravities, all separating from the Aqueous Fluid, in the same Point of Time, range themselves in the exact Figure of the Nucleus, and so march on Rank and File in the same Order, whereupon they all unite in the same Moment, and form the first Coat, or Stratum: And so on successively, the next Series of Corpuscles, that are nearest the foregoing in their Specific Gravities, separating from the Urine as before, form the next succeeding Coat.

Now, as there are an infinite Series of Corpuscles, so little differing in their specific Gravities, as scarce to be distinguishable from each other; so it follows, according to these Principles, that they must necessarily move in very irregular Directions, and by frequent Conflicts, greatly incommode each other in their March; and, consequently, there appears little Reason to suppose, that the Corpuscles of the Urine, in their Separations, observe such exact Discipline; or if they did, such a Process would be so far from forming the Coats of the Stone, in that exact Manner, we often observe; that more likely it would produce one uniform compact Pebble Stone, without the least Distincti-

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on of Coats ; because the Incrustations would so closely follow upon each other, as scarce to be distinguishable, I am sure not separable from the Nucleus.

I am rather of Opinion, that the Concretion of the Matter laminatim ; or the Determination of it's Corpuscles into Coats, or Strata, as may be perceived in the Formation of Bezoar Stones, depends upon the Nucleus indeterminately attracting the Corpuscles of Gravel, as they float in the Urine, and accidentally come within the Sphere of it's Attraction, whereby they unite with it by Contact : The first Strata's that invest the Nucleus are often so minutely thin, as scarce to be distinguished : And they sometimes are so loosely attached to this central Principle or Nucleus, that upon shaking the Stone you may perceive it to rattle ; so that according to these Principles, an entire Coat is added to the Stone every Time we make Urine ; for from the Absence of the Urine, the new form'd Stratum has Time to dry and barken to the Nucleus, or the Coats that already invest it.

BUT though the Principles of Motion and Gravitation are most evidently concerned, in generating Stones in the Bladder,

Bladder, yet there seems some other Principle necessary in order to alter the Direction of the concreting Corpufcles, and determine the Figure of the Stone. For the Laws of Motion and Gravitation could never oblige these Corpufcles of Sand and Gravel, the Materials of the Stone, to deflect from their natural, Position of Defcent whereby all the Corpufcles of the same Gravity, fufpended in a Fluid, take their Places at equidistant Spaces from the Center, and confequently are parallel to the Horizon, were they not influenced by a Superiour Principle.

THIS influential Power, whereby Bodies deflect from their natural Laws of Gravity and Defcent; I am of Opinion, arifes from the Law of Attraction; and the Proofs of the Fact, or of this influential Power, from Stones taken out of the Bladder, is an evident Demonstration of the Veracity of that Law: For Gravitation, according to the full extent of that Word, is an effential Property implanted in all Matter, whereby, in it's Motions, it descends towards the Center of the Earth: Attraction is the fecond Law of Nature, and a Confequence of the former, whereby Bodies are determined

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mined towards each other, according to the Similitude of their Corpuscles to come into Contacts with each other.

AND this is the Reason, why the Concreting Materials of the Urine, in the Bladder, gravitate every where, in Directions very nearly parallel to the Figure of the Stone, and not according to the Laws of their Descent.

BESIDES, were the mere Law of Gravity, to determine the Motions of the Corpuscles, then they must always subside agreeably to that Law: And, in this Case, they would continually fall Parallel to the Direction of the Horizon, and upon no Account could they, in their Motions, deflect from this Determination; save what Alteration the Figure of the Bladder, or accidental Causes, might occasion: So that in this Case, the Figure of most Stones would be plain in their upper Surfaces, and Convex on that Side that rested upon the Fund of the Bladder: But we seldom see Stones thus formed, for most of these Concretes, extracted from this Organ, are either oblong, Oval, Pyriform, or shaped in resemblance of the Bladder.

BUT

BUT, besides Stones formed in the Bladder, from a Nucleus discharged from the Kidneys, or from a Principle of the Urine contained in the Bladder, there is also another Cause of Concretion, that arises from any foreign Body, being accidentally introduced into the Bladder; and which thence forward becomes the Principle of Attraction, to all the Corpuscles of Salt or Earth, that separate from the Urine. Nor could we ever conceive what Influence an Iron Nail, an Ivory Bodkin, and divers other Things, would have in disposing the solid Contents of the Urine, to separate and concrete; if these Instruments had not been extracted from the Bladder, incruited with large Portions of petrified Matter, in Form of a firm Stone.

THERE might, indeed, some Objections be made to the Force of the foregoing Arguments, in Defence of the Generation of Stones, from the Principles of Motion, Gravitation, and Attraction, were there not divers Facts, so well attested, that they evidently demonstrate the Veracity of these Laws. To support the Evidence of these Facts, I must desire the Reader's Leave, to take
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Notice of divers Instances, in the Philosophical Transactions, where a Leaden Bullet, an Iron Nail, and an Ivory Bodkin, being accidentally admitted into the Bladder, and afterwards extracted, were found invested with crustacious Coats, not unlike the Strata of other Stones generated from a Nucleus.

Now it is impossible, in the Nature of Things, that this could ever happen, did not the Instrument, thus accidentally introduced into the Bladder, more strongly draw the Principles of the Urine, than the aqueous Fluid, the same Principles suspended in that Medium. Is not this as clear a Proof, as can be given ; that the Constituent Parts of these Instruments have a Power to make a Separation in the Principles of the Urine ; and of concreting them into a Stone, that could not be effected under a sound State of these Organs, were not one of these Instruments admitted into the Bladder. And, in these Cases, there needs not any Faultiness of either the Kidneys or Bladder, to predispose the Salts and Earthy Parts of the Urine to separate, as is absolutely necessary in all Cases, where the Stone is preternaturally formed in either of the foregoing Organs ; for here the Attraction

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on of Cohesion, in the Extraneous Body, is sufficient to over-balance the Motion of the saline and earthy Principles contained in the Urine; whereupon it Supplies the Place of a Nucleus, in forming the Stone.

THESE are the three immediate Causes of the Stone, nor do I conceive it possible, that Stones can be bred in the Bladder, but that they must either arise; from a Principle of the Urine contained in the Bladder; from a Nucleus generated in the Kidneys, or from accidental Causes. The swifter or slower Progress the Stone makes in Bulk, is owing to the Patient's living upon Aliments, that abound more or less with a saline, earthy Matter. This saline, earthy Matter, is often the Result of drinking large Quantities of Wine, especially, in Bodies where the Stomach is weak and unable throughly to digest the tartarous, earthy Salts. Indeed these Aliments not only afford the Materials of the Stone; but often occasion a Fit: But as I have so copiously enlarged upon the Article of Diet, and it's Effects upon the Constitution of human Bodies, in my Treatise of Consumptions, so I shall recommend the Perusal of that Book, to all

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those, that are desirous of farther Satisfaction, upon that Subject.

As to the Air, and Exercise, I shall consider their Influence, when I come to treat of the Causes, that put the Stone in Motion, and occasion a Fit; for it is certain, that no Stone was ever generated in either Kidneys or Bladder, from the Influence of the Air, or Exercise considered apart, without some other assisting Cause, to give it Being.

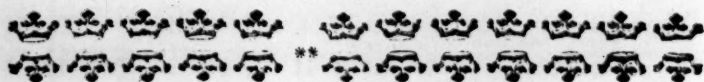
BUT there is one Circumstance observable in the Generation of the Stone, that I must beg leave to take Notice of, before I close this Chapter, because it is a Point that has not been attempted by any of these Authors, I know of, that have treated upon this Subject: And that is, why those that have been once cut for the Stone, seldom are liable to a second Operation; since if the same Principles and Causes were to continue, it is reasonable to conclude that the same Effects should follow; that is, those, from whom Stones have been once extracted, should be as liable to generate these Concretes again, as they were before.

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of the Gravel and Stone. 101

To this I answer, that the Cavities of the Tubuli Urinarii and Carunculæ Papillares are so dilated, and sometimes broken by the Passage of the first Stone, or Nucleus, especially if it be large, that all Sand and small Gravel, for the future, easily secrete through their patulous Orifices, without their Corpuscles coming so near, as to be influenced by each other's Attractions, in order to form a Nucleus, for the Basis of a succeeding Stone: And if they once pass the secretory Vessels of the Kidneys, and descend into the Bladder, it will be difficult to conceive, how the Salts, or earthy Parts of the Urine, can separate Time enough, in so capacious a Cavity, for the Formation of the Stone; and consequently they will be discharged the Bladder, without any Inconveniency happening to this Organ.





C H A P. VII.

Of the Difference of Stones, in Relation to their Density, Magnitude, Number and Colour; with a Mechanical Explanation of the Causes of these several Differences.

THUS far, we have examined into the immediate Causes of Stones, and their Production in either Kidneys, or Bladder. But there are some Properties, that will oblige us to take a nearer View of these Concretes, in Order to discover the Mechanical Affections of their different Densities, Magnitudes, Number, and Colours; and the most probable Causes of these several Phenomena.

Now the Reason, why most Stones, in the Bladder, are harder; more close, and compact in their Texture, than those

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those of the Kidneys is, because, in the Bladder, the Urine is more at rest; and because the Corpuscles Constituting the Matter of the Stone, meet each other in the Center of their Attraction, with a greater Impetus or Force; from the greater Space they describe, in their Motion towards the Nucleus, or Body of the Stone.

IN the Tubuli Urinarii of the Kidneys, where most of the Stones, infesting these Organs, are formed, the Spaces their Corpuscles describe, in their separation and Secretion, are so extremely minute, that it is impossible, but that they would oftner unite, in forming Gravel and Stones in those Organs, were not their Attraction of Cohesion, or Inclination to Contact, greatly diminished by the Rapidity of their Motion; for where ever there is a Motion, either in the Corpuscles of Matter, or in the aqueous Menstruum, in which they are suspended, great enough to over-balance their Nisus to Contact, there, they will move off from each other according to the Law of Repulsion: But if, in such Cases, from the Law of Gravity, their Attractive, overballances their Repulsive Principle; and by this Means, they are brought to Unite;

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then their Contacts will be so few, and their Impulse so weak, as only to give the Stones, thus formed, a very loose Cohesion of Parts.

Now, according to these Principles, it will necessarily follow, that the different Density of Stones must arise, from the different Gravity of the Salts, and earthy Matter, that compose the Stone; and the different Velocity with which it's Corpuscles meet each other in their various Occursions, as they float in the Urine; which is one Reason why most Stones generated in the Kidneys are lighter, softer, and of a more brittle Texture, than those generated in the Bladder.

BUT tho' the Principles of Gravitation, Attraction, and Repulsion, have a great Power, in the Modification of Stones, in Relation to their Hardness or Softness; yet much of their Solidity, and Density, is owing to the different Figures of their constituent Parts; for the Hardness and Solidity of these Stones, is in Proportion to the Degrees of Attraction; and the Degrees of Attraction to the Number of Contacts, that the gravelly Corpuscles touch each other at, when

when they unite, in Order to form one of these solid Concretes in the Bladder.

NOW, as the Number of Contacts, in any Quantity of Matter, are greater, the more it's Corpuscles deviate from a perfect, spherical Figure; and as all Corpuscles deviate most from Spheres, the more they tend to a Cubic Form: So it follows, that Corpuscles subsisting under the Form of a Cubic Figure, will afford the greatest Number of Contacts; so it follows that those Corpuscles, that afford the greatest Number of Contacts, will produce the densest and firmest Stones; for this Firmness is a Quality in Bodies, that arises from the Closeness of their Corpuscles, when they unite in Contact with each other: And, from these Principles, it equally follows, that Corpuscles of a Spherical Figure will afford the fewest Number of Contacts, and consequently generate Stones of a light, soft, and brittle Texture.

AND if these Principles afford us the most clear Demonstrations of the Difference of Stones, in Relation to their Hardness, Stability, and Firmness; and of the Powers by whose Means
these

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these different Properties are brought about ; then it follows, that the same Principles will discover to us the Reason, why some Stones are rough, in their Surfaces, others smooth and polished ; for all Corpuscles that are globular in Figure, produce rough Stones with unequal or rugged Surfaces, because they touch only at Six Points ; their Arches rendering them incapable of any more Contacts. Then it follows upon the same Principles, that Corpuscles of square or cubick Figures, will produce smooth Stones with polished Surfaces.

HENCE it follows, that the Weight of all Stones depend not so much upon the Gravity of their primitive Corpuscles, as upon the Figures of their Component Parts, whereby they more or less closely attract each other, in forming these petrified Concretes ; for the Gravity of all Stones, in Relation to the Quantity of Matter they contain, under a Surface of greater or lesser Dimensions, is in Proportion to their Solidity, and this Solidity to the Closeness of their Corpuscles, and that Closeness to their Approaching more or less near to Cubes ;
whereby

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whereby they are more or less strongly attached to each other.

As to the Bigness of Stones : If we consider them in Respect of Parts, those bred in the Kidneys are always less than those in the Bladder, and for the most Part, as we have already observed, those in the Bladder received their first Rudiments in the Kidneys, which, descending by the Ureters into the Bladder prove the Ground-Work of the Stone; and which, if not timely discharged, may encrease to an extraordinary Magnitude.

OF some, I have heard, that upon Extraction, weighed Thirty Two Ounces; and *Hildanus*, in his Observations, reports of one that weighed Twenty Two Ounces; but the largest I ever saw, or indeed heard of, is that prodigious great one, reserved in the Charity-Hospital at *Paris*, as a choice Rarity, and, which, when extracted, weighed One and Fifty Ounces; but the Gentleman, from whom it was taken, died under the Operation.

THE least Stones, in Children, are about the Bigness of large Pease; some as great as Cherries; and these again may

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may be as large as Apricocks or Peaches. In Men they are found of all the fore-mentioned Sizes; and many Times as large as a Hen's Egg, and sometimes, though rarely, as big as a large Quince; though this is a monstrous Size, and not common to any Subject.

MUCH of the Cause, that hastens or retards the Progress of Stones, in Relation to their Bulk, is owing to the attractive Power of the Nucleus, and the Disposition of the Materials of the Urine to be attracted by it. When the Corpuscles that compose the Stone are well digested, and greatly broken by the Force of the several Organs, before they come to separate by the Kidneys, it must necessarily follow, that they will continue for a good Space of Time, after they come into the Bladder, suspended in the urinous Fluid, before they separate; and longer still, before their Gravity brings them into Contact with the Nucleus, which is the chief Cause of protracting the Encrease of Bulk in the Stone.

BUT if the Digestive Powers happen to be greatly impaired, and the Patient indulges in Aliments extremely poignant, then the Salts and earthy Parts of
our

our Juices, as they come to the Kidneys for Secretion, will exert a very great attractive Force towards each other; and being admitted into the Bladder, crude and undigested, will very speedily separate from the Urine, join with the Nucleus, and facilitate the Progress of the Stone in Bulk.

AND this Indisposition of the Organs, and living upon Aliments abounding with Salts, are the sole Causes why the Stone makes a considerable Progress in some Persons sooner, than it shall arrive at the same Magnitude in others; and why it's Advances in Bulk are greatly hastened or protracted at different Times; that is, why it's Growth is much more encreased at one Time, than, in the same Period, at another, in the same Subject.

As to the Colour of Stones, we observe almost as great Variety, in those of the Kidneys and Bladder; as among those that receive their Generation in Rivers. They are found to be White, Red, Yellow, Fillemot, of a pale Green, Ash Colour; and of a dark Brown. I once saw a Cream coloured Stone all bespeckled with red Veins, which appeared very
beautiful

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beautiful to the Eye : From whence, I pray, arises these Differences of Colour in Stones ; from whence should they arise, but from the same Causes, that Diversify their Texture ; and from whence that Difference of Texture ; but from the different Motions and Attractions of the Matter : For it is undeniably certain, that where-ever the Corpuscles of these Concretes are attended with different Relations and Effects, there, they must either have different Causes to produce them, or different Degrees of the same Cause ; for to vary the Property of Colour, in any Subject, is the same as to give it a new Surface ; or which is Tantamount, a new Power of reflecting the Rays of Light in a different Manner, from what it did before : So that the Cause, of these different Colours in different Stones, is, that the Salts, and earthy Parts, of which they are composed, subside into different Orders, and Arrangements, according to their different Specific Gravities, Figures, and Impulses ; from whose Determination there will necessarily result a different Surface in the Stone, a different Power of Refrangibility in the Rays of Light ;

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Light ; and which consequently will exhibit to the Eye, a different Colour of red, yellow, green, &c.

THE Number of Stones, found in the Kidneys and Bladder, are almost as different, as their Magnitude or Colour ; some shall have a vast many small Stones in the Bladder, or at least that come from the Kidneys to the Bladder. I once, in Company, heard a Gentleman aver, that he had, at Times, discharged with his Urine six hundred actual Stones, the least of which, as he then affirmed, exceeded a White Pea in Bigness : but he was a Traveller ; and for Gentlemen of a travelling Complexion, I always make large Allowances. Of many I have heard, that have had two or three in the Bladder, and these of a considerable Bigness ; but when they are in Numbers, they often slide upon each other, till they wear their Flats as slick, as if their Surfaces were polished.

Dr Nathaniel Fairfax, in *Lowthorp's* Abridgment of the *Philosophical Transactions*, gives the Relation of a Case very extraordinary. It is concerning a Lad that was cut for the Stone ; out of whose

whose Bladder were taken, at one Time, 95 Stones, most of whose Flats were as slick as a Piece of polish'd Marble; which Slickness, I suppose, must have arisen from the frequent Triture of their Surfaces against each other.

BUT most commonly, if the Stone be large, it is but one; unless pebbelous Matter, breaking off from it's Substance, by some great Fall, or extraordinary Concussion of the Body, lay the Foundation of divers lesser Stones: In this Case every one of the separated Parts, attracts a Portion of the sandy Sediment of the Urine, which, in Time forms Stones of divers Magnitudes, and very irregular Figures: For the largest of all, being rendered unequal in it's Angles, by parting with some of it's Substance; and which consequently acquires thereby sharp-pointed Corners, may, upon any Motion, grate against the tender Membranes of the Bladder, and wound it's Nervose Coat. When this Accident happens, it commonly greatly incommodes the Patient; for the lacerated Parts, being exposed to the Urine, impregnated with a vast Quantity of sharp, fretting

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ting Salts, must excite dreadful Pains, be a frequent Cause of making bloody Urine ; and, if not timely prevented, by proper Applications, lay the Foundation of an incurable Ulcer.





C H A P. VIII.

*Of the Marks, Symptoms, and Characters,
that accompany the Nephritick Pa-
roxyſm, in Caſes, where the Gravel or
Stone does not paſs from the Kidneys
to the Bladder.*



IN the preceeding Chapters, I have conſidered the Riſe and Progreſs of Gravel and Stones, their Matter and Parts; and have demonſtrated from divers Experiments, that ſaline Bodies are the Baſis of Sand and Gravel; and the Efficient Cauſe of the Stones Concretion in either Kidneys or Bladder: I ſhall now proceed, upon the ſame Principles, to diſcover the Effects, and dangerous Conſequences theſe petrified Concretes will
occasion

of the Gravel and Stone. 115

occasion in the foregoing Organs, point out the particular Marks, Symptoms, and Characters, that, in the clearest Light, discover these Concretes to be lodged in those Parts; and close all by a Prognosis of their Event, or the Judgment we ought to make concerning the Fate of the Patient, under his present Circumstances; for, unless we are perfectly well apprized of the Justness of the Complaints, and know that the Symptoms arise from Gravel or Stones infesting these Organs; we proceed in the Dark; and attempt to Cure we know not what: And, in such Cases, there are infinite odds, but that, instead of Relieving the Patient, we precipitate him into a great deal of real Mischief, by wrong Applications.

BESIDES, we ought carefully to distinguish between the Paroxysm, in which the Stone discovers an Inclination to Pass; and a Fit, wherein it does not give any evident Marks of this Inclination; because, in these two Cases, the Administration and Application of Remedies will be widely different: And this Discovery will best be made, from the Difference of the Pains, the Seat of the

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Stone, and other Circumstances, that disturb the Parts affected ; and which will easily be observed by a discerning Genius.

THE Nephritic Fit, or Paroxysm, is so called from the Pain, Heat, and Inflammation, that often affect the Kidneys, from a Stone or Gravel lodged in either of these Organs. These Symptoms arise from the Endeavours of Nature to discharge the Stone ; these Endeavours are caused from the Tension, or Mechanism of the Fibres, that compose the Kidneys and Parts adjacent : This Tension arises from the Motion of the Stone, which Motion is owing to the Changes of the Air : or to disagreeable Diet ; or to hard Riding ; and which is the Reason why a Fit either seizes Spring, or Fall of the Leaf, or after a Debauch ; or after riding long Journeys : All of which Particulars shall be the Subject of the 11th Chapter, where I shall expressly treat of the Causes, that put the Stone in Motion, and excite a Fit.

IN the mean time, we are to consider, that the Stone in the Kidneys, sometimes, after repeated Efforts, is not able to pass ; and there then succeed divers Paroxysms,

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roxyfms, or Fits from the fame Stone : Nay, in fome Cafes, a Stone may continue divers Years in the Body of the Kidney, without giving any great Pain or Uneafinefs to the Patient ; and we have an Example of a Stone found in this Part ; which filled the Pelvis, all the Branches of the Veffels ; and even poffeffed the greateft Part of the Kidney itfelf, and yet the Patient complained of no very painful Symptoms, till a fudden Shock accidentally altered it's Pofition, and unfortunately brought on a fatal Paroxyfm.

WHILE Sand, or Gravel only, continue to affect the Kidneys; they often are difcharged, in great Loads, without much Pain or Uneafinefs to thofe Parts. In this Cafe the Orifices of the Carunculæ papillares, and Tubuli urinarii, are only a little dilated for their Paffage; but as none of thefe Veffels are broken, fo it feldom happens that Bloody Urine is made: but if this Sand or Gravel happen to Concreate into a Stone; then the Pain is more grinding about the Small of the Back, and Region of the Loins, which fpreads itfelf into the Neighbouring Parts. If the Pain be dull, heavy, and attended

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with a Weight upon the Part, it is a sure Indication, that the Stone is lodged in the Substance of the Kidney : This Obtuseness, or Dullness of the Pain, proceeds from a Want of Nerves in the Parenchyma of these Parts ; for all Parts that are Parenchymatous have fewer Nerves, and consequently suffer less Pain, from those Diseases they labour under, than others, whose Nervose Fibres are more in Number, and consequently more exposed to the Pressure of those Accidents, that affect them.

THESE Symptoms, attending the Stone or Gravel, are distinguished from the Symptoms of the Cholic, as well by their different Situation, as the Causes that produce them ; for, whereas, the Symptoms of Gravel or Stone arise from hard, solid Concretions, that disturb the Action of the Kidneys, and occasion great Pains : On the contrary the Symptoms of the Cholic arise from Wind, or sharp Humours lodged in the Intestines : So that there is not only a Difference in the Seat of these different Diseases, but a manifest Difference in the Matter, in the Organs, and in the Causes

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Causes that produce them; and it must be surprizing, if such evident Marks of Diversity should not be discoverable by a sagacious Mind.

I HAVE often suggested, that those enormous Vomitings, that some People are subject to, after a full Meal, might be occasioned from a Stone in the Kidney, incapable of being discharged by reason of it's Largeness: And, in the Case of a certain Lady, I opened my Opinion freely, and told her my Apprehensions were, that her frequent Vomitings after her Meals, not appeasable from the best Medicines, might arise from a Stone in the left Kidney, because the Pain seemed more to press on that Side; and the Event verified my Prognosis; for, in that Kidney, was found, after her Decease, a Stone so large, and so strongly embraced by the Fibres of the Kidney, that it was impossible it ever could Pass.

These Bubbles in the Urine, that Dr Ratty takes Notice of, from *Hippocrates*, in his Treatise of the *Urinary Passages*, are a very precarious Symptom of either Stone or Gravel; for they only are an

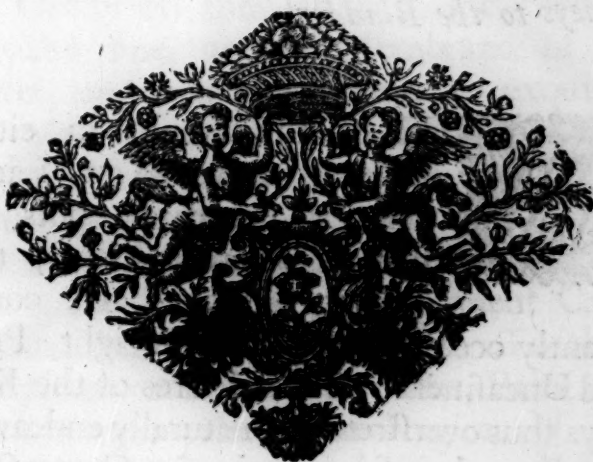
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Indication of Wind ; and Wind is generally a Symptom of every Chronick Disease: So that Wind, and consequently these Bullæ or Bubbles equally affect the Urine under the Scurvy, Asthma, and Cholic ; as under the Stone or Gravel ; and therefore the Existence of these Bubbles in the Urine can be no Proof, whereon we may ground a certain Indication of these Maladies.

WHEN a Stone is bred in the Substance of the Kidney, and arrived to that Largeness, as to distract the Fibres of the Organ it possesses, greatly above their natural Capacity of Contraction, they then lose their Tone, and thenceforward there will not remain the least Hopes of it's ever passing. In this Case the Patient will be subject to frequent Vomitings after Meals, and scarce easie till the last ingested Meats, though ever so light, are flung up again: However, though there is frequently a Sense of Weight about the Region of the Loins ; yet often but very little Pain ; because of the Want of Nerves in the Substance of the Kidney. And these are the most remarkable Symptoms,
that

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that affect the Patient, when the Stone is lodged in the Substance of the Kidney, and does not discover an Inclination to pass from the affected Kidney, by the Ureter, into the Bladder.



CHAP.



C H A P. IX.

Of the Marks, Symptoms, and Concomitants, that affect the several Organs, in the Passage of a Stone, from the Kidneys to the Bladder.

WHEN the Stone, in either Kidney, arrives to any Largeness, it necessarily puts the Fibres, where it lodges, to a greater Stretch, and consequently occasions a greater Weight, Pain, and Uneasiness. These Fibres of the Kidneys thus overstretch'd, naturally endeavour to restore themselves again, by Contracting their Machinulæ; and which consequently press the Stone forwards, and downwards by the Ureters towards the Bladder. The Stone, by this Pressure, is first forced through the Carunculæ papillares,

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pillares, and Tubuli Urinarii into the Pelvis, where the Pain is encreased, becomes more sensibly Sharp and Cutting; and with the Stone the Pain descends a little, followed with a small Discharge of bloody Urine.

By and by, it comes into the Head of the Ureter, (always pressing forwards, according to the Tendency of Nature) upon which the Pain increases, and becomes intolerable, especially, if the Stone be much larger, than can well pass the Cavity of the Ureter; for then it tears the fine, nervous Membrane of the Ureter, and puts the Patient to exquisite Torture; upon which all the Nerves near the Seat of the Stone from the Consent of Parts, are drawn into Spasms, Tremors, and Convulsions; and these Disorders affecting the Stomach, are a frequent Cause of Reachings and Vomitings. To these Symptoms succeed a great Heat, Pain, and Inflammation about the Region of the Loines. A Difficulty of walking, or indeed of standing, upright, because the Nerves of the Ureter, from the extreme Pungency of the Stone, are convulsed and drawn together: A Torpor or Numbness of the Thigh and Legg, from the
Stone,

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Stone, in the affected Ureter, pressing against the Psoas Muscle of the same Side.

UNDER these Circumstances, if the Pain be very sharp, it extends downwards to the Testicle of the affected Side, which, from the Convulsion of the Nerves disseminated in both, the Kidney, and Testicle, is more retracted and drawn up than the other: And this Symptom I look upon, to be a certain Pathognomonick, to distinguish the Stone in the Kidney, from the Cholic Pain in the Intestines, though the latter is seated never so advantageously to deceive: For, if the Pain arise from a Stone in the Kidney, then the Testicle of one Side only is drawn up, and inclined to the affected Ureter of that Side; but if the Pain be owing to the Cholic in the Intestines, then he may observe both Stones equally retracted, and a Contraction equally of the Scrotum; for all Pains that are grievous and tormenting, as also all Pleasures that are excessively pleasing, equally cause a Retraction of the Stones, and a Contraction, or Purging up of the Scrotum.

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To these Symptoms we may add a Strangury, from a Stimulus affecting the Sphincter Muscle of the Bladder, with a Convulsion ; and not, as some ignorantly suppose, from the Obstruction of the affected Ureter ; for the Urine can as well flow, by one Ureter, as the other, though not in that Quantity, in the same given Time. What Urine can be excerned, under the Painfulness of these Symptoms, is generally limpid, clear, and watery. When Things come to this pass, a Nausea and Reaching, are inseparable Symptoms, which, under excessive violent Pains, frequently terminate in downright Vomitings.

As to the Contents, that come off from the Stomach, in such Cases, nothing of Certainty can be indicated therefrom ; for the Qualities of the Matter discharged, depend more upon the Constitution, and the Nature of those Meats he lives upon, than any Cause of the Disease, and I have observed those troubled with the Stone and Gravel, vomit as much Choler, as those labouring under the most violent Symptoms of the Cholic : Only, by the following Observations, we may learn to distinguish
with

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with some Certainty : That the windy Cholic moves from Part to Part, and is sometimes more before, sometimes more behind ; other whiles higher, then again lower ; now in the Back, then in the Belly or Sides. But the Stone generally, in it's Passage, moves gradually downwards, often not without inexpressible Pain and Torture ; which Progress when it makes, (if the Stone be large, and, in it's Passage from the Kidneys, have lacerated any Part) is most commonly attended with bloody Urine, which many Times is thick, turbid, with a dark, obfuscate, sandy Sediment.

BESIDES it is a common Distinctive Sign, taken Notice of by several Authors treating of the Stone and Cholic ; that the Violence of the Pain in the former is always easier upon a full Stomach ; but in some Cases I have observed quite the Reverse : And that a certain Gentleman labouring under the Stone, in the left Kidney, could never be easie after a Repast ; and this I judged to proceed from the Pressure of a full Stomach upon the Kidney affected, whereby the Motion of the Stone was

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was encreased, and consequently the Pain and other Symptoms exasperated.

AND here, I must beg leave to observe, that the first nephritic Paroxysm, is commonly the most acute, sharp, and cutting; and the Reason I assign for this is; that the Stone, in it's first Passage, meets with great Resistance, from the Narrow Orifices of the Tubuli urinarii, and Ureters: So that, in it's Passage, it sometimes tears their fine Membranes and Vessels, by stretching their Cavities, greatly above their natural Dimensions: But, that, after their Cavities are dilated and enlarged, from the Passage of this first Stone, they thenceforward readily admit all succeeding Stones, to pass with less Violence and Molestation; and which consequently excite lesser Pain, and fewer of the distracting Symptoms.



C H A P.



C H A P. X.

*Of the Agency of the Stone, after it is
got into the Bladder, in producing a
Fit or Paroxysm.*



W H E N the Stone falls into the Bladder, generally all the Symptoms abate, and are easier for the present ; and the Distemper, having changed it's Seat, in a great Measure also, changes it's Symptoms. In the first Paroxysms, because the Stone is little and light, the Symptoms are rather uneasie, and troublesome, than painful. The Urine is thin, pale, clear, and watery : There is an Itching about the Region of the Pubes, and at the Glans of the Membrum Virile :

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Virile : As the Stone gains in Bulk, a Weight presses some about the Region of the Groin, which, by others, is perceived more or less to affect the Perinæum.

UNDER large Stones, the Symptoms proportionably encrease: The Patient also is frequently disturbed with a Tenesmus: So that he scarce ever wants to Urine, but he perceives an Inclination to go to Stool at the same Time : This double Inclination arises from some little Branches of the same Nerve, inserted into the Bladder, Intestinum Rectum, and Sphincter Ani, where by the Office of these separate Organs are mutually affected, upon any preternatural Stimulus, that molests the Membranes of the Bladder.

THE Patient inclines to make Water, strains, and with much adoe dribbles out a few Drops, with great Heat and Pain, most sensibly felt about the Perforation of the Glans : By and by, the Stone bobs against the Sphincter Muscle, upon which he has the same Inclination to Urine again, and he strives to discharge it, but finds his Labour as fruitless as before: And so, every little

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Interval of Time, he endeavours and strains, but all to no purpose, a Spoonful or two being the most he can get away; and then is always looking, and peeping, and spying into the Urinal, to observe what Quantity of Gravel, or little Stones he can discover in it.

INDEED, after all, I cannot perceive any more certain Diagnostic, to determine whether or no a Stone be lodged in the Bladder, than by Searching with the Catheter; and as for a Stone in either Kidney, it is certain, that an Ulcer in the Intestines, seated opposite to that Kidney, will mimick most of the above-mentioned Symptoms, and deceive the most skilful Physician; and I was concerned with a Patient above 12 Years agoe, where five Physicians of no mean Rank were deceived, and my self also: But then the Patient had been troubled with Gravel, some time before; and there were strong Indications to conclude a Stone in the Kidney, when such evident Proofs had preceeded. However, the Ulcer turned to a Gangrene, and killed him in a few Days; nor was it possible to have recovered him, if we had known it to be an Ulcer, his Obstinacy was so great
and

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and ungovernable, both in Point of Diet and Medicine: And being, at the Desire of his Friends, opened, we could perceive little or no Gravel in either Kidneys or Bladder; but tracing over the Intestines, we, opposite to the left Kidney, perceived the inner Membrane of the Duodenum sphacelated.

SOME Authors mention, that if the Finger be forced up the Anus, and pressed towards the Bladder, if a Stone be there, it will feel hard; but this Method of searching for a Stone will not always hold; and there may be a Stone in the Bladder, and not discoverable by this Means: I rather am of Opinion, that the sandy Sediment, that subsides and barks to the Sides and Bottom of the Urinal is the strongest Proof of the Stone in the Bladder; for this discovers, that the fabulous Matter is of a concreting Nature.

IN some Cases, where the Fibres, or Membranes of the Kidneys or Bladder, are extremely tender or weak, the Stone, by grating against their Tunicks, may occasion an Ulcer in either of the foregoing Organs. This Symptom may most certainly be concluded to happen,

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from

from the following Indications. In the Beginning ; great Pain, Heat, and a Fever indicate an Inflammation : If these Symptoms attack the small of the Back, it is a certain Sign, that one of the Kidneys is the Part affected ; if near the Os Pubis ; that the Bladder is the Seat of the Disease : From these Symptoms of Pain, Heat, and Fever, not being timely dissipated, an inflammatory Tumour arises, attended with a throbbing beating Pain, and a great Tension of the Part, which is a Symptom of all Inflammatory Tumours arising from an Obstruction in the smallest Arterial Branches of any Organ. By and by the Quantity of Matter, accumulated in the Tumour, over-stretches the Fibres, breaks their Texture, and opens in an Abscess, which in Time turns to an Ulcer.

WHEN the Abscess first breaks, the Urine flows bloody ; and the Pain, Heat, and Inflammation somewhat assuage : By and by small Flakes, or Filaments are discharged with the Urine, not unlike little thin Skins, or the minute Parings of Leather : Sometime after there follows a purulent Pus, which when it proceeds from the Bladder, smells stronger,

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er, and is more offensive, than if it comes from the Kidneys ; and in great Ulcerations of the Bladder, I have known the whole Urinous Fluid congealed into a Substance like Size.

IN some scorbutick Bodies, where the Juices are highly vitiated, the Ulcerated Parts, towards the last Stage of Life, mortifie ; for more is to be feared from an Inflammation of the Kidneys or Bladder, turning to an Ulcer, and that Ulcer to a Gangrene, from the different evil Habit of the Solids and Fluids, than any evil Disposition of the Disease ; for in a Body perfectly sound, these Symptoms of Pain, Heat, and Inflammation come and go without any dangerous Consequences. The dangerous Consequences, therefore, to be feared, must arise from the Texture of these internal Organs, highly impaired in their Motions from a vitious Manner of Diet, whereby they are rendered incapable of dislodging the Matter of the Inflammation. Hence arises an Ulcer, that not submitting to the proper Rules of Medicine, at last Gangrenes, and terminates in a Mortification, the last fatal Stage of all Ulcers in vitiated Habits.

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I was sometime ago concerned for a Gentleman, where the whole Mass of Urine (a little while after made) was almost continually converted into a ropy viscid Slime, not unlike Frog-Spawn. This Change certainly argued a great Decay, or Consumption of the fore-said Bowel; his Friends, after his Decease were very desirous of having him opened, and I was present myself at the Dissection.

As we inspected the Body, we found the Kidneys little altered from their natural Shape and Position; we could discover no Wounds in their Membranes or Vessels; neither any Ulcer in their Substance, but tracing their Ureters, we perceived a Blackness about the middle of the right Ureter, which, no doubt, formerly had been ulcerated, but now was perfectly dry and well.

IN the Bladder we found two Stones, the one near as big as a Walnut, the other not larger than a middling Hazel-Nut; but the Bladder itself was so shrivelled up, and so thin with all towards the Neck, where was a large Ulcer, that, in all my Life, I never saw a blown Bladder so transparent, which made me greatly wonder,

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wonder that the Weight of the Stones did not break those fine, small, capillary Fibres, that composed it's Membranes.

FROM this Example. I think it is evident, that the Bladder, as well as other Parts, is subject to Decays and Wastes; and whatever may be said in support of the Serum's giving Viscidness to the Urine (which, certainly, in it's natural State, it never can do, because we never see any such Effects to follow from it) yet I am sensible the Bladder did afford a share of the congealing Matter, or else whence could come such a Consumption of it's Parenchyma.

INDEED some Authors, of no little Esteem, aver, that it is no unusual Thing for the purulent Matter in an Empyema, or Abscess of the Breast, to be translated to the Kidneys, pass into the Bladder, and be discharged with the Urine. But though I shall ingenuously confess, I never knew such a Case to happen, in the Course of my Practice; yet, granting the Possibility of such a Translation, rarely can any Pus flow to the Kidneys, from any remote Part; but, that, some Symptoms, previously indicating

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cating an Ulcer in that Part, by diligent Observation, may be discovered ; and then we shall have little Reason any longer to be perplexed with this Enquiry, *viz.* Whether it comes from the Breast, or other Parts ; or is directly discharged from the Kidneys or Bladder, because the Symptoms of the Parts principally affected, will immediately resolve this knotty Difficulty.

WHEN the Stone is large and rough, in it's Surface, it often puts the Patient to exquisite Torture ; for it's ragged Points grating against the nerveose Coat of the Bladder, may convulse it's Sphincter Muscic, and be the Occasion of exquisite Pain and Misery : Hence follows an Obstruction of the Urinary Passages, with a total Suppression of the Urine it self. This total Suppression, continuing long to affect these Organs, overheats the Body, and renders it subject to a Fever of the inflammatory Kind, which, in a little Time, attacks the Head, and disturbs the Brain, Nerves, and Spirits, with Deliriums, Phrensies, and great Thirsts. Sometime after the Legs Pit, the Belly Swells, and the Face appears bloated.

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of the Gravel and Stone.

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UNDER these dismal Circumstances, nothing can retrieve him from certain Death, but a free Passage to the Urine: It being the Opinion of *Galen*, and several other learned Writers since his Time, that few Persons have been able to endure a total Suppression of Urine, arising from a Stone in the Bladder, above fourteen Days.

THE Diagnosticks that attend the Gravel, are the same with those that accompany the Stone: And what hath been said in Tracing out the Symptoms of the one, may equally be applied in descrying those of the other; only observe, that in calculous Cases, or when the Stone is in Fault, the Pains are always more racking and intollerable: Add to this, that a fabulous Matter always appears in the Urine, when Gravel is only in Fault, and barks to the Sides of the Urinal sometime before any Pain shall give Disturbance to these Parts: Besides, when Gravel only occasions the Fit, then great Loads of Sand shall often croud the Urine, and be excerned with it, about the going off of the Paroxysm, which is otherwise in the Stone, for
then

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then the Urine is limpid, clear, and watery, and so continues during the Fit.

SOMETIMES Wind affects the Bowels, at the same Time that Gravel disturbs the Kidneys : This Complication is very frequently met with in Practice; and may most properly be called the Stone Cholic ; because it is attended with great Discharges of Wind, both upwards and downwards, upon the Fits leaving the Patient.

LASTLY, It is no uncommon Thing for the Gout, towards the Decline of Life, to leave it's proper Mansion, the Limbs, and wander up into the Stomach, where sometimes, in it's Peregrinations, it falls upon the Kidneys and Bladder; and there excites the same Symptoms, though milder, than what is usually observed in the Stone.

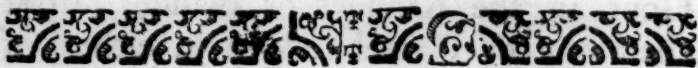
WHEN the Gout attacks either Kidneys or Bladder; in the Beginning the Pain is rather uneasie than tormenting; but sometime after it rages with greater Violence, and the Patient is subject to a Strangury. In this Case, instead of pale or red Sand, which always accompanies the Gravel, there appears in the Urine a White, tophaceous Sediment not
unlike

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unlike prepared Crabs Eyes, or Coral :
And this I look upon as the most material, distinctive Sign to judge of the Gout in the Kidneys or Bladder, from the Stone or Gravel lodged in either of these Organs, especially if the Patient was subject to the Gout before the Invasion of the Fit.



CHAP.



C H A P. XI.

Of the Causes that excite the Nephritic Paroxysm, and occasion the Stone to remove from the Kidneys to the Bladder; as also of the Causes of it's Motion, and the Reason of a Fit, after it is arrived in the Bladder.

IN most acute Diseases, the Cause of the Symptoms is the same with the Cause of the Disease: So that if you relieve the Symptoms; you infallibly cure the Disease: but generally the Case is otherwise in Chronical Maladies, especially those attended with acute Fits; as the Asthma, Gout, Stone, and Gravel; where, in Relieving the Symptoms,

Symptoms, you only intitle the Patient to a tranſient Relief, if you do not, at the ſame Time, proceed farther and Cure the Diſeaſe, by a Removal of the Cauſes.

ALL Effects moſt certainly muſt have Cauſes capable of producing them; and, according to the Idea we have of the Inertia of Matter, a Stone, in either Kidney, would eternally continue, in the ſame State and Poſition, where it is once lodged, were there not certain Cauſes to put it in Motion and excite a Fit: Our Buſineſs therefore, in this Chapter, is to diſcover theſe Cauſes, that put the Stone in Motion; and force it, from the Sinus or Cavity of the Kidney into the Bladder; as alſo to conſider the Action of theſe Cauſes, in producing a Fit after it is arrived in the Bladder; and thoſe I ſhall comprehend under theſe three following Heads: Firſt, An Errour in our Diet. Secondly, The Inclemencies of the Air: And thirdly over-violent Exerciſe: And I queſtion whether any Thing in Nature, is capable of diſcompoſing the Stone once at Reſt, and putting it into Motion, whether in the Kidneys or Bladder; but what may be reduceable under

under one or other of these three Non-naturals.

OUR Diet claims the first Consideration, as it is not only the chief, efficient Cause, of the Generation of the Stone; but a Cause principally concerned in putting it in Motion, and producing a Fit, after it is generated, and lodged in either Kidneys or Bladder.

WHEN we frequently charge into the Habit great Quantities of Meats and Drinks, abounding with Plenty of Salts, and a high inflammable Spirit, it naturally follows, that they will excite irregular Motions in both Kidneys and Bladder; for whatever has a Power to enforce the Motion of the Heart and Arteries will, in a great Measure, encrease the Motion of the Blood, the Separations and Secretions of the Fluids in every Part of the Body; and consequently force the Stone, whether in the Kidneys or Bladder, out of it's former Position; for this Encrease of Motion, in the Heart and Arteries, produces an Encrease of Motion in the Fibres of the Kidneys or Bladder, and consequently an Encrease of Motion in the Stone itself, which puts the Parts to Pain, and excites divers other Symptoms
in

in Proportion to the Magnitude of the Stone, and the Disposition of the Organs affected.

THE Air most of all offends the Disposition of calculous Persons, and disposes the Stone to Motion, when it affects us with the Extrems of Heat and Dryness; Moisture and Coldness; for, by the sudden Change and Alteration of these elementary Qualities, it enforces the Circulation of the Blood, the Secretion of the Juices, and consequently raises the Action of the most intimate Fibres of the Kidneys and Bladder, whereby the Stone is put into Motion. For it is nothing but the Stone in it's Motion, Grating or Jarring against the tender Fibres of the Kidneys or Bladder that puts the Patient to Pain, and occasions a Fit: And this is the Reason why the Fits of the Stone, like those of the Gout, are most exasperated about Spring-Time, and Fall of the Leaf; because at these different Seasons our Bodies suffer the most considerable Changes in their Motions, from the Influence of this Element, whereby most Persons disposed to Stone or Gravel are sure to suffer a Fit.

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By over violent Exercise, here, I understand Riding, Vaulting, Jumping, or whatever else we engage upon, that may put the Stone in Motion, alter it's Position, and occasion a Fit : These different Modes of Motion are frequent Causes of the first Paroxysm ; and many have discovered a Fit of the Stone, after riding a great Journey, that never were subject to any of it's Symptoms before : If the Stone be rough and pointed in it's Surface, then, by any violent Motion, or sudden Concussion of the Body, it may grate against the Nervose Tunick of the Bladder, wound it's tender Membrane, and create dreadful Pains. Hence follows an Inflammation of this Organ, an Excoriation of it's inner Membrane, bloody Urine ; a scalding Heat in making of it, which is most sensible, and painful upon the Excretion of the last Discharge ; and which in Time comes away mixt with an ichorous, fætid Pus, a sure Indication that the Bladder is ulcerated.

BUT, if none of these Causes preceded the Invasion of a nephritic Paroxysm, then the Fit is the Effect of the Powers or Endeavours of Nature to discharge so troublesome

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troublesome a Guest: That is, the internal Frame and Constitution of the Fibres, that compose the Kidney affected, exert their mechanical Necessity to dislodge the Stone: This mechanical Necessity inseparably follows, from the Pain and Stimulus, that the Stone impresses upon the Organ of the Kidney affected. For it has pleased the All-wise Architect, so to adjust the several Springs and Organs of this animated Machine, wherewith we are cloathed, that no Obstruction should fall upon any of the Organs, but that they must necessarily exert their mechanical Efforts for it's Discharge: And, for this Reason, the Fibres of the Kidneys, like the Membranes of the Womb, have a muscular, contractile Power, whereby they naturally contract their Machinulae for the Discharge of all little Stones, that lodge themselves in the Interstices of these Organs, especially when they grow so large as to disturb their Action.

THUS far it evidently appears, that, That, which lays the Foundation of all Stones and Gravel: That, which more especially affords the Matter of these petrified Concretes, is our Diet: And, That, which is the Vehicle to convey

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this

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this Matter to the Kidneys and Bladder, is Wine, Water, Ale; or whatever else of Fluidity we make use of for the Digestion of our solid Meats. And hence it necessarily follows, that the same Causes, that generate the Matter of the Stone, which is our Diet, will necessarily excite a Fit, by putting it in Motion; while the Air and Exercise are only concern'd as accidental Causes, that act at certain Seasons, in giving us a Paroxysm.



C H A P.



C H A P. XII.

*Of Computing the Quantity of the Causes,
that is, the Greatness of the Stone,
from the Perception of Weight and Pain;
and the given Force of the other Sym-
ptoms.*



F, then, a Fit of the Stone
arise, from the Motion of
the Stone; and the Degrees of
Pain, Heat, and Inflamma-
tion, be in Proportion to the
Bulk of the Stone, and the Degrees of
it's Motion; then it follows, that the
Intenseness of the Symptoms will rise
or fall in Proportion to the Magnitude
of the Stone, and the frequency of it's
Motion.

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IT may, indeed, seem a difficult Point, to attempt to discover the Magnitude of Stones, from the given Force of the Symptoms; but since the Symptoms of all Diseases are in Proportion to the Greatness of their Causes; and as their Causes always hold Correspondence with the Quantity of Matter, that excites them; it necessarily follows, that the Danger of all Diseases must arise from the Quantity of Matter, that forms the Causes; the Greatness of it's Motion, that excites the Symptoms, and the Necessity of the Organs affected to Life.

WEIGHT and Pain are two Symptoms, that comprehend a great deal of the Effects of the Stone, when it is large; for while it is little, it seldom creates any great Inconveniencies in the Bladder. The Sense of Weight arises from the Largeness of the Stone, and is always correspondent thereto. If, therefore, the Patient perceives a great Pressure upon the Os Pubis, or the Perinæum; It is a certain Indication that the Stone is large: Differently, must we conclude, concerning that titulating Sensation near the End of the Glans, which is often, and frequent, under little Stones, especially

especially when they move circularly in the Bladder, which is their proper Motion.

BUT if, from any Cause, the Motion of the Stone is encreased, or which is the same, the Stone itself, by the Acquisition of new Matter, enlarges in Bulk, then, instead of this titulating Sensation, a Strangury ensues, attended with a Sense of a scalding Heat in the Urine, which arises from the mere Pressure of the Stone, acting against the fine membranous Coat of the Bladder.

As all Stones have a Weight in Proportion to their Gravity, and as their Gravity is always answerable to the Attracting Principle of the Corpuscles, that compose these Concretes; so it follows that the Force and Pressure of Stones, against the Fibres of the Bladder, will be in Proportion to their Magnitude and Weight: If a large Stone move slowly in the Bladder, the Symptoms of Pain will be dull, heavy, and less acute; but if it be put in Motion by any foreign Agent; as the Air, Exercise, or Diet; and act with a greater Velocity and Impulse, then it will strike through the mucous Coat into the Nervose Membrane of this

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Organ; whereupon the Symptoms will become more acute and sensible.

Now, if these Symptoms arise from the Stone's affecting of the Bladder, then they will discover the Degrees of the Causes, that is, the Quantity of Motion; and this Quantity of Motion the Largeness of the Stone. If the Symptoms are very painful, it is a general Indication, that the Stone is either large, or that there are Numbers of them; or that there is much Gravel in the Bladder: I say, it is a general Indication, for, that there are some Exceptions to this Rule, as there are to most Rules in Physick, is certain; for sometimes a very small Stone falling upon a very tender, nervous Part, as the Head of the Ureter, shall excite a most dreadful Torture: This was the Case of a Gentleman riding a Journey; where the Stone was not so big as a small Pea, which, yet, falling upon the Head of the Ureter, gave him such a sudden Shock, as almost knocked him off Horse-Back: About three Hours after, he made half a Pint of bloody Urine, and with it this little Stone was discharged.

BUT, unless in Circumstances agreeable to the foregoing Exceptions, it must be

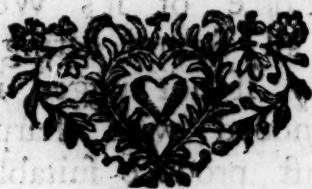
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be confessed, that the Force of the Symptoms are always in Proportion to the Pressure of the Stone; and that a great Stone, or a large Quantity of Gravel, which is equivalent to a great Stone, must necessarily excite great Heat, with raging Symptoms; and this more so, if the Stone be of a rugged, angular, uneven Surface: And these Symptoms will as necessarily vary, from different Degrees of the Causes, as the different Degrees of Motion will excite different Degrees of Heat.

BUT if a little Stone act by Vertue of Percussion, or, from the Violence of External Causes, is struck against any Part, then it will have the same Effect, as if it were a large Stone moving with a smaller Impulse: In this Case the Force of Percussion being superadded to the Motion of the Stone, renders it's Effects greatly more afflicting, under the Paroxysm, than if the Symptoms arose from the mere Force of it's Weight. But otherwise, all Stones acting by their Gravity only, if not rugged, in their Surfaces, or endued with sharp, irregular Angles, must produce suitable Effects: For the Symptoms must be in proportion to the Pressure of the Causes, and the Pressure of the Causes to the Large-

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ness of the Stone: So that little Stones will create but little Pains, great Stones great Pains, and large Stones extreme, insufferable Torture; and which must kill the Patient in a little Time, if not speedily extracted; for Pains that are excessively grievous and tormenting, can not long be born: These Effects, arising from such Causes, must soon break the Constitution, impair the Organs; and put an End to the wretched Life of the miserable Patient: And this is the Method of computing, with the greatest Exactness, the Causes of the most raging Symptoms, that can possibly affect the Kidneys or Bladder, from a Stone or Gravel lodged in either of these Organs.



C H A P.



C H A P. XIII.

Of the Prognosticks, or Principles that enable us to judge of the Event of the Disease; or what will be the Fate of the Patient, from the Intensity of the Paroxysms, and the Frequency of their Return.

I SHALL close the first Part of this Work, with an Examination of the several Prognostic Signs, which are the Principles that, during the Course of the Disease, or the Existence of the Stone, indicate what will be the Fate of the Patient, in Relation to his Life, Death, or Recovery.

I look upon all or most Paroxysms of Stone or Gravel, whether in Kidneys or Bladder, arising without any evident Cause, to be only the Efforts of Nature to unburthen her self of the Load, that oppresses her; that is, of the Stone, that by it's Motion

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Motion puts the Organs to Pain, where it is seated. The Prognosticks therefore must be taken from the different Force of the Symptoms, when they do appear: The Intervals of Time they discontinue their Appearance; and the greater or lesser Impressions they leave upon the Constitution of the several Organs, after the Fit is over.

IT is the Opinion of *Hippocrates*, that Children or young People are most subject to Stone and Gravel in the Bladder; and these more advanced, in Years to both in the Kidneys. That sage Author, in the 26th Aphorism of his third Book of Aphorisms, applies the Terms, *Calculi Vesicæ*, to signify the Stone in Children: And in the 31st Aphorism of the same Book he uses *Nephritides* to express it in People advancing towards old Age: But however this might be, in the Times of *Hippocrates*, yet I am sure the contrary appears, in our Times, but too evident to want any Proof: For I believe, where you discover one Child, or Boy suffering under this afflicting Malady, you may observe three Men or Women labouring under the same; though, indeed, Women are not so naturally addicted to Gravel
or

or Stone, as Men are, from the Largeness of their Urinary Passages, and their greater Dilatability, whereby they Discharge all small Stones and Gravel, before they arrive to any considerable Greatness in the Bladder: And for these that are larger, they may be drawn, with a proper Instrument, by a Dilatation of the Neck of the Bladder, without subjecting them to the severe Operation of Lithotomy.

THE Stone seated in either Organ, is a grievous Malady; and if hereditary, by all is judged incurable. In this Case it may admit of Palliation; and some considerable Relief may be given, for a little Time, by proper Medicines: But even Section in this Case will not avail him more, than, for sometime, to Previlege him from his Torture. For the Stone will generate again, and, in Time, acquire as great, or it may be, a greater Bulk than before: And this second Attempt to extract it by Section (should the Patient be so resolute and courageous as to undergo the Operation) will be attended with greater Danger, from the Callosity they may be obliged to cut near, or perhaps upon.

BY Reason of the Number of Symptoms that affect the Patient, in some it is more dangerous

dangerous than in others; for where the Stone is large, rough, and unequal in it's Surface, there it brings great Torment and Misery. If the Asperities, or Motion of the Stone ulcerate the Kidneys, it is a dangerous Sign, creating great Torture, cutting Pains, Fevers, Convulsions, Lethargies, great Weaknesses, with a total Suppression of Urine; and if these Symptoms continue obstinately to outbrave the Force of the best Medicines, all Hopes of Recovery in a little Time will vanish.

THE same racking Disorders I have observed to affect the Patient, from a Stone in the Bladder, but rarely did I ever know the Patient perfectly recover, especially if he was much advanced in Years. Indeed my Father laboured under all the above-mentioned Symptoms in a Fit of the Stone; and yet recovered, after he was turned of Sixty, and had suffered under a total Suppression for nine Days.

IT is a safe Sign, if a thin pale Urine attend the Paroxysm in the Beginning, afterwards it grows thick, turbid, and lets fall a sandy Sediment; for these Symptoms denote the Stone to be of a friable Nature, easily dissolvable, and that the Fit is going off.

IF the Stone be so large, as to adhere to the Ureter, in it's Passage, from the Kidney
to

to the Bladder; or if both Ureters be plugged up with Sand or Gravel, then the Pain will be extreme and racking: Vomiting will ensue in the Extremity of the Fit; the Patient will be Comatose, and there can be no means used to prevent his certain Death, but by either dissolving the Stone, and Gravel, or forcing them from their Lodgement in the Cavity of the Ureters. I was present at the Opening of a Gentleman, that died of the Stone, and expired in the Extremity of the Fit. We examined with all Diligence, both the right Kidney and Bladder, but found no Appearance of any Stone, or scarce Gravel in either; but pressing my Finger near the Neck of the Bladder, I felt, in the Ureter, about it's oblique Insertion, a large Stone near the Bigness of a Filbert, which, when we came to view, was all bloody; and the Sinus it lodged in contained near a spoonful of the same, mixed with a fourth Part of a dark, gravelly Matter; and it is remarkable that five Days before he died, he urined near three spoonfuls of bloody Urine with some little Knots of real Blood in it.

I HAVE sometimes observed, that when the Pain, from a Stone in the Ureter, hath been most sharp, acutely sensible, and of long Continuance, that a Delirium hath seized

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seized the Patient; and had not Nature, above Expectation assisted with all her Efforts in removing the Obstruction, by giving a Passage to the Stone, the unfortunate Patient had inevitably lost his Life. It portends well to the Patient, when Plenty of Sand or Gravel crouds the Urine, and all the Symptoms grow milder upon that Discharge. When the Paroxysms begin to croud in upon each other, and daily vex him with their torturing Symptoms, the sooner he submits to the Operation of Lithotomy, the speedier will be his Relief; especially if he finds no Benefit from Medicine.

WITH Respect to the Magnitude or Number of Stones, that also is of great Importance to be known; for all Stones, the less they be, the safer; and tho' there be Numbers, if they be small, it is easier and better for the Patient; and this is verified in respect of Section: Large Stones are ever dangerous; and the Obligation we are under to enlarge, in Lithotomy, the Orifice of the Wound, according to the Magnitude of the Stone, renders this Operation still more dangerous.

THO' the Stone be large; yet if it be of a friable, brittle Nature, the Patient not

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not abounding with gross Humours, not advanced in Years; nor worn out with frequent, nephritick Paroxysms, by the Use of proper Medicines, it may be dissolved: But a Stone that is wrapped up in a Capsule, and adheres to the Membrane of the Bladder, ought not to be meddled with: And exceeding large, hard, polished Stones come under the same Predicament; and cannot safely be undertaken by either Pharmacy or Lithotomy. If much Pus be voided with the Urine, and a Stimulating Pain be felt in either of the Groins, or Region of the Loins, such Symptoms indicate an Ulcer in the Part affected, and may be concluded dangerous; tho' Wounds or Ulcers in the Kidneys, or Bladder, are not mortal, unless in old Men, or those of a bad Habit of Body.

WHEN the Stone in the Bladder happens to be so large, as not to be able to enter the narrow Passage of the Urethra for it's Discharge; nothing but the Hand of a skilful Lithotomist (after the best Medicines have been used in vain) can be a Means to free the Patient from his Thralldom: And this Operation he may safely undergo, provided an Inflammation or Gangreen does not affect the Wound
made

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made for the Extraction of the Stone: And where the Indications strongly favour the Operation, in my Opinion the sooner he submits to it the better; for it is highly to be presumed, that Delays, and Length of Time, will only serve to encrease the Danger, by exciting frequent Paroxysms, that will exasperate the Symptoms, impair the Organs, and weaken the Constitution: And so, at last, he will be obliged to submit to the Operation, when he is least able to bear it; and rather chuse, under such deplorable Circumstances, to fling his Life into the most imminent Hazard, than endure the Pressure of his present Torment and Misery.



P A R T



A COMPLEAT, NEW,
TREATISE
OF THE
GRAVEL and *STONE*.



PART II.



INTRODUCTION to the CURE.



S I have, in the first Part of this Treatise, pointed out the several Marks and Characters, that lay before us the Nature of Gravel and Stone; their manner of Generation; the several Causes that produce them, with all their Effects, Symptoms, and Consequences upon the urinary
M Organs:

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Organs: So I shall in this second Part, proceed upon the same Principles, to discover the several Indications necessary to accomplish a successful Cure; by expelling all Gravel and Stones from the foregoing Organs, while they are little; and attempting a Dissolution of those petrified Concretes, in Cases where they are larger, than can pass the urinary Organs. For in vain do we attempt to dive into the Theory of Diseases; in vain do we endeavour to discover their Natures and Causes, if those Attempts do not improve our Knowledge in the Cure of Diseases, and render us more successful in Practice.

THE Cure of the Stone, I must confess is attended with many perplexing Difficulties, not common to other Diseases; for most other Diseases find a ready Vent, by some of the common Passages of Nature: Thus most Affections of the Stomach and Intestines, go off by Vomiting or Purging: Those of the Blood are relieved by Bleeding and Perspiration; and those of the Lungs by Expectoration; but for Stones in the Kidneys or Bladder larger than can pass these Organs, Mankind is left almost destitute of Help, and without a Remedy.

AND altho' it be generally acknowledged, that the Dissolution of the Stone, by Medicine, is a Task, of all others the most difficult

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ficult to accomplish; yet the miserable Lives of many worthy Gentlemen, whom I daily beheld groaning under the cruel Tyranny of this insupportable Malady, inspired me with a Resolution to attempt the best I was able for their Relief. And I will be bold to say, that if the Rules and Cautions I have, in the following Chapters, laid down, be but punctually observed, and strictly put in Practice, many will receive not only great Benefit, but a perfect Cure: And, in those, whose Constitutions happen to be much impaired by the Violence of Nephritick Paroxysms, and, that, therefore an absolute Cure is less to be expected; yet I hope a Palliation of the Symptoms, even under such deplorable Circumstances, will be no inconsiderable Advantage to the afflicted Patient.

It has been a Method not uncommon among Physicians, heretofore, in their Writings upon Diseases, to conceal some favourite Medicine, and extol it as a never failing Specifick in some popular Disease: The Design of those Gentlemen, I suppose was rather to lure the credulous to their Practice, than Benefit Mankind by any new and useful Discoveries of their own.

HOWEVER I shall in the Prosecution and Management of this whole Affair, act quite

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opposite to the ungenerous Principles of these selfish Men, rather, in this, consulting the real Benefit and Welfare of Mankind in general, than any way regarding my own particular Advantage: And following herein the Example and Humanity of our great Prince and Master *Hippocrates*, who perceiving, by his great Abilities, that the then present Disposition of the Season, did forebode a heavy Plague about to fall on some Parts of *Greece*, commanded his Pupils to disperse themselves through the several Provinces, where he judged the infectious Myasma might exert its most raging Violence; and gave them proper Instructions both how to attack the fiery Disease, and remove the threatening Symptoms: For which singular piece of Service, all *Greece* did consent to honour him as a God; erecting a most magnificent Statue, in Reverence to his Memory, which they placed in the Temple among their other Pagan Deities: This was the Honour: These the Trophies conferred upon this great Man for his singular Virtue and Humanity, as you may read at large in *Pliny's* Natural History.

AND, for my own Part, I cannot conceive, but that a Physician, accustomed to reflect upon the Nature of Things, might discover
the

the Approach of a pestilential Contagion, with the same Facility, that a skilful Mariner does the Approach of a Storm at Sea, were the former as frequent as the latter; whereby he might get a set of Observations to conduct him in his Enquiries; for they both are founded upon the same Principles, *viz.* the Changes and Alterations of the Air: They both are dependent upon Observation and Experience: Only, in this, they differ; that Storms gather frequently, and are often productive of very great and sudden Alterations in the Weather; while Pestilential Seasons creep upon us almost without any visible Presages, and scarce invade our Climate once in an Age.

BUT the Face of Physic has suffered various Revolutions since the Times of the divine *Hippocrates*; and it's scarce a Crime now to quack for Advantage, and turn Empirick for Profit, we have so many Men of Note and Character to bear us out in this Practice: And there are those that may be ashamed to impose their specifick Arcana's upon the credulous World, and vend them after such a quacking manner for such extravagant Prices.

THIS Concealment of Medicines, in my humble Opinion, is not only a downright Affront to the Body of Professors, as it sup-

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poses a Discovery made by the Author, not communicated to the rest of that learned Body, but is a lessening of the Dignity of the Profession it self, and consequently calls for the Censure of that Noble College, these unworthy Gentlemen have the Honour to be Members of.

IN vain do they stigmatize Quacks and Empiricks with opprobrious Names, while themselves, by their Actions, are guilty of the same Facts they condemn in others. Not that I would debar the honourable Professors from those Advantages, that ought to accrue in Practice; neither would I have Gentlemen of the Faculty neglect the proper Means for the Support of a handsome way of Life; As in Divinity, so in Physick, the Labourer is worthy of his Hire: And that great Expence and Charge required to qualify a Physician for Practice, make it necessary, that a proper Allowance, for his Advice, be considered: Nor could it be expected, that Gentlemen would be so infatuated, as to educate their Children to a Profession, that would not countervail their Cost and Labour; And how unreasonable would it be, that they, of all Men, should be neglected and disregarded, whose only Business is to relieve the Miseries and Afflictions of Mankind?

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ALL I would insinuate, by this Digression is, to remind the learned Sons of Art, of the Dignity of their Profession, and the Honour of its Practice: And how much it is fallen from that ancient Glory and Honour it was formerly possessed of, when Kings and Princes thought it, in no wise, a lessening of their Regalia to condescend to the Practice, as well as Study of this most excellent Art.

I have observed, during the Course of my Practice, that the same Remedies, administered in the same Cases, and as near as I could conjecture, to Persons little differing in Habit or Constitution, have not always produced the same Effects: Nay the same Medicine, that mightily relieved a Person at one Time, shall sometimes fail of Success in another; because Diseases vary in their Return, from what they were, in the original Disease: And so long as the Symptoms of Diseases differ, and Constitutions alter; so long will there be a necessity of using Variety of Applications.

AND, in vain hath Heaven created such a Variety of Roots, Herbs, Seeds, Flowers, &c. In vain has he destined so many Parts of Animals for the Service and Use of Man under his most pressing Dolors, if those vile Medicafters can furnish us with a Remedy

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so extensive and extraordinary in its Virtues; as some of them pretend to. And what is most lamentable is, that this vile Cant, this little, low Cunning should not only prevail among mean plebeian Spirits, and take with the Dregs of the People; but that my Lord and my Lady, Sir *William*, Sir *Thomas* and right Worshipful, should countenance and give Umbrage to such Delusions, to the Shame and Disgrace of Men of Honour and Credit in the Art.

BUT I shall plainly prove in the Sequel of this Discourse, that there never did exist such a Specifick, as was not liable to great and many Exceptions: And granting the most that any Empirick can desire, that an universal Specifick should be born, and come from the Womb of our common Mother, that could cure any one Disease, and remove all its Symptoms; and that all other Distempers should enjoy the same Privilege of a safe Specifick; yet this so extraordinary Advantage would not introduce an Empirical Practice, that is, empower every one to cure their own Diseases; but still there would remain a Necessity for the Counsel and Advice of the learned Physician.

To support this Assertion, we may observe, that the Jesuits Bark, the most certain Specifick yet known amongst us,

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does not (I do not say it cannot) cure all Agues and intermittent Fevers; and daily Experience assures us, that several Accidents may happen to render its Effects not only useless, but sometimes dangerous even in those very Diseases in which, by all judicious Physicians, it is allowed to have the greatest Influence: That when it is irregularly given, without any Regard to the present Symptoms, before proper Evacuations, not managed with that Care and Discretion necessary in such Cases; not well timed as to the Fits, and very often, what is of great Consequence, not being joined with proper, assisting Remedies; many times for want of this Management it shall be so far from curing Agues and intermittent Fevers, that its Use continued shall greatly disorder their Fits, and strike the Distemper upon the Nerves, creating other Diseases more fatal to the Constitution of the Patient, than those, it was given to remove and prevent.

MANY think it flings the Distemper upon the Membranes of the Bones; and others will tell you it excites Rheumatisms in the Limbs, and crowds the Body with Obstructions: But these dangerous Effects never happen, but where People have the Misfortune to fall under ignorant Hands. All is not Gold that glisters; and a gilt Chariot

riot and pompous Retinue are not the only Qualifications, that indicate an able Physician. A bold and daring Ignorance, may crowd it self under the Lustre of these Appearances; and gain in the World an Esteem much more considerable, than they ever deserved; while Men of Honour, and a more exalted Genius shall pass unregarded for want of a native Courage, and Presence of Mind to display their Parts.

I knew a Physician, that for several Years carried the greatest Sway in Practice, of any Gentleman in the City, that gave no small Blow to the Reputation of the Jesuits Bark. He being sent for to a Merchant labouring under a dangerous pleuritick Fever, unfortunately, in a Remission of the Fever, prescribed the Bark, that brought on the most dangerous Symptoms; and had not Dr. *Ratclif*, then living, been called to his Relief, the unhappy Patient had inevitably lost his Life.

BUT to leave this Digression, and turn the Thread of my Discourse more to the present Occasion: I am sensible there is not any Disease for which more Specificks have been pretended than in this I am treating of: And if ever a specifick Medicine be desirable, in any Disease, most certainly in this of the Stone; and we can never too much regret the want of
a certain

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a certain safe specifick Remedy, that might give Relief and Ease to the Patient, lying under the racking Torture of its most pressing Symptoms: But then if we seriously consider the Nature of the Malady, the Hardness of the Stone, Tenderness of the Parts, Weakness of the Patient; it may be sadly broken and worn out by reason of the Violence of nephritick Paroxysms and Fits of the Stone: And then again, if we be further attentive to the Bustle and Disorder, that must necessarily arise from such a Medicine tumultuating with the Stone, in order to break its Texture, and dissolve it in Pieces, we shall have reason to conclude, that such a Blessing (for I do believe such a Remedy existent in the Nature of Things) will scarce ever be attainable in this Disease; but what, from the Difference of Stones, and the different Constitution of the Patient, will be liable to great and many Exceptions.

SOME Time ago being in Company with a Chymical Gentleman lately returned from his Travels; our Discourse insensibly drew us into a Dissertation upon the Nature of Gravel and Stones generated in human Bodies, and the Severity of their Symptoms; upon which he gave me to understand, that during his stay abroad, he had discovered a most certain,

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certain, safe, and infallible Remedy, that would give sure Relief, and intirely cure this Distemper, under all its most pressing Ailments.

AGAINST the Matter of this Remedy, he boasted such Wonders of, I objected the Difficulty of its Operation; and the Danger that would attend such a Bustle and Commotion in the Bladder, as would be necessary for breaking the Texture of some hard Stones, in order to their Dissolution: But to these Objections he answered, That this Arcanum of his did not act by virtue of any clashing Principles, or fermenting Acid lodg'd in its Substance; neither did that Disorder, which I supposed, arise in its Operation; but it did perform all its specifick Virtue, by gently penetrating and intimately insinuating its Diuretic Subtilty, consisting of an active nitrous Salt, into the minute Pores of the Stone; which all along destroying the viscid Lympha, that cements together the arenulous Particles, the same becomes a Mass of sandy, gravelly Matter which passes off, and is discharged with the Urine.

WE debated a long time upon the Words *insinuating its diuretic Subtilty consisting of an active nitrous Salt*; because they carried no Idea that I could clearly conceive the Meaning of: In short I urged him more plainly

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to explain the Principles of his Secret, but he refused, and assured me, that it was a Compound Medicine, and, that, neither Sal Nitri, or any of its Preparations did come in to the Composition: Upon the Whole, the Reasons he offered seemed strong and convincing; and he would have sold me the secret for four hundred Guineas.

IN answer to this I told him, I would carry him to four Gentlemen, every one of whom I was certain had a Stone in the Bladder; and he should prepare his Remedy to the best Advantage, and if it did but succeed, in the Cure of three, by a Dissolution of the Stone, I assured him I would give him a thousand Pounds for his Secret; but in case it did not succeed, he should be content to lose his Pains and Trouble without any Gratuities: I offered to article with him upon these Points, but my Gentleman could not be prevailed upon to sign my Articles of Agreement; upon which I strongly suspected, that his Remedy was much of the same Nature with those Numbers of pretended, infallible Specificks, sold up and down the City, set off in our common News Papers with great Commendations, but when tried, their Performances are not answerable.

INDEED so resolute was he in Defence of his Specifick; so bold and positive as to the
Certainty

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Certainty of its Operation ; that had but the half of what he advanced in Defence of its Efficacy, been true, we might, with Reason, have believed, that an Angel from Heaven had dispensed the Medicine, and the unerring Word given it Power.

To conclude this Introduction : As I know of no particular Specifick that will absolutely dissolve the Stone in the Bladder ; so I have taken care not to obtrude any Medicine of my own upon the World as an infallible Noftrum : But if there be, in Nature, an universal Dissolvent, that will specifically dissolve the Stone ; let us all with one Accord invoke the supreme Author of Nature, that he, who governs the World, and disposes of all mortal Events, would direct the Genius of some favourite Son, to a Discovery of this inestimable Secret.



CHAP.

C H A P. I.

*Of Diet, Air, Exercise, and the Passions;
and their Mechanical Affections in the Cure
of the Stone and Gravel.*

IN Relation to the Cure of Gravel and Stone, the Physician ought first and chiefly to employ his Care in adjusting the Patient's Diet; which, in Conjunction with proper Remedies, may conduce to a very good End and Purpose: And I come now to consider them in a Point of Light, different from what I took notice of them before: For then the great Question was, how far a Diet upon vitious Aliments contributed to the Generation of the Stone; now how much a right Regulation may assist in releasing the Body from its Thralldom: And I am perswaded, that the Influence of Diet is not so conspicuous in the Cure of any Disease as this of the Stone and Gravel.

IN the third Chapter of the first Part we have proved that the Basis of all Stones, Gravel, and fabulous Concretions, bred in either Kidneys or Bladder, arise from Salts; that the Union of these Salts, in forming these Concretes in the foregoing Organs, depends upon their not being thoroughly digested by
the

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the Force of the Stomach, Heart, and Arteries; whereupon, when they come to the Kidneys for Secretion, they are necessarily drawn into Contact with each other, by the Attraction of Cohesion, and consequently either form Sand, Gravel, or Stones: The most proper Method therefore to prevent the Generation and Increase of the Stone is to prevent the Increase of Salts in the Blood; and the way to do this is to oblige the Patient, as much as possible, to live upon Aliments that nourish much, and least abound with saline Matter, the Cause of Concretion in the Materials of the Stone.

WOULD the Patient, therefore, be prevail'd upon, as soon as ever he perceives the first Symptoms of Gravel or Stone to affect him, to diet himself upon Vegetables, or the lighter Animals, there needs no Question to be made, but that such a thin, soft, attenuating Diet, would keep the Salts asunder; and consequently prevent the Generation of either Gravel or Stone.

THE Aliments, I would advise him to live upon, are Turnips, Potatoes, Parsnips, Oysters, if in Season, new laid Eggs, Harts-Horn Gellies, Chocolate, Calves Feet, which nourish much in Consumptions of the Bladder, and dispose the Ulcer to heal: And I am acquainted with a Gentleman who, for
some

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some time dieting himself upon them and Milk, was perfectly cured of a dangerous Ulcer in the Bladder.

MILK, and all that comes of Milk, except Cheese and Curds, afford excellent Nourishment; and Custards, White-Pots, Syllabubs, and all the Niceties that can be prepared from Milk, may be eaten with Advantage in Affections of the Kidneys and Bladder; and sometimes, the Cow's Milk warm from the Teats, I am inclinable to think preferable to the Ass's Milk, unless the Patient be much impaired by the Severity of frequent Fits of the Stone: But in all weakly Constitutions, in aged People and emaciated Bodies, or those worn out with nephritick Paroxysms, the Ass's Milk is certainly preferable, as being more thin, light, and easier of Digestion; not containing so many oily, buttery Particles, to obstruct its Entrance into the Lacteals, as the former.

WHEY, the Offspring of Milk, and, which only arises from a Change in the Texture of its Parts, followed with a Separation of the Serum upon that Change, is a Liquor both nourishing, cooling, and cleansing; and therefore will be of great Service to those that are subject to Inflammations of the Kidneys and Bladder.

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UPON the Virtues of Honey I could enlarge for ever: It is a sovereign Remedy, and affords both Food and Medicine: An Ounce and a half, or two Ounces of this excellent Balsam dissolved in a Pint of new Milk, warm from the Cow, will afford an excellent Breakfast to the Patient; and the same Mixture for his Supper would have a very good Effect; for Honey softens the Bowels, relaxes the Intestines, and disposes those to a Stool that are subject to a, costive Belly, which is the greatest Benefit that the Patient can receive under the Stone and Gravel.

BUT every thing that is extremely saline ought to be avoided, as of the worst Consequence: And even common Salt, with which we season our Aliments, ought to be but sparingly used; for it is an Ingredient of the Stone; and, where it is taken in great Quantities, mightily assists its Concretion.

AMONGST the Variety of Fluids, I know none preferable in the Gravel and Stone, to Water. That is best for Use, under these Affections, that is lightest, softest and clearest, being perfectly free of all terrestrial Mixtures: And for this reason I look upon soft River Water to be preferable to both *Bristol* or any other Water whatever, where there is a Stone in the Bladder; because it is freest from Salts, and not so apt to concrete,

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as several other Waters are. The only Fluid that has digested my Aliments, from my Infancy, till I was upwards of Thirty, was Spring or River Water: And I bless God my Habit of Body is not less strong, hale, and vigorous, than those that have employed a stronger Menstruum.

IN respect of Wines, the roughest is least to be chosen, unless they are rendered familiar to the Habit by Custom. White *Lisbon* is by most accounted a good safe Wine; and is gently diuretick: It comes most into Medicine, and of all others is best for a weak Stomach: All I shall say more upon this Article of Liquors is, that Wines saturated with plenty of Spirits best agree with *English* Bodies: Poor Wines thin the Constitution, and make the Body look meagre; and tho' strong bodied Wines abound with Salts, yet they are of a dissolving Nature, and prevent the Salts of the Blood from uniting in Contacts with each other; and consequently seldom suffer them to concrete either into Stones or Gravel.

IN the Choice of Air, That, certainly is preferable that is most permanent: But seeing that the various Changes of this Element, in the Revolution of Time, will not long permit the Patient to enjoy the same Effects; it will be highly proper for him to

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consult upon the Situation of the Place, that may afford him the greatest Tranquillity. And were I only to regard the Qualities of the Air, without any other Consideration, I should esteem *Montpelier* in *France*, preferable to all other Places whatever; as a Country where the Air is extremely serene, clear, and permanent; so that the Patient there is seldom disturbed with Fits of the Stone from the various Impressions of this Element: But then if we seriously reflect upon the coarse Waters, together with the sharp tartarous Wines we meet with, in most Parts of *France*; and, which, not only contribute to the Generation of the Stone, but also to its encrease in Bulk; I very much question, whether the Benefits expected, from the Changes and Alterations of the Air, may not be more than overbalanced by the Damages, he may receive from their Liquors.

HOWEVER, in all Cases of the Stone and Gravel, the Patient ought well to regard his own Constitution, and fix his Residence near some Village, remarkable for a fine, clear, balsamick Air. Let the Place of his Habitation, if possible, be free from great Woods, and high Mountains; in a plain Champain Country, where Nothing may obstruct the free Breeze of this pure, balsamick Element.

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THE next of the Non-naturals, that comes under Consideration, in the Cure of Persons subject to the Gravel or Stone, is Exercise; This Habitude, superadded to the natural Motions of the Solids and Fluids, is very considerable, and of great Efficacy while only Gravel: But if any Indications of a Stone appear in the Bladder, which is discoverable from the Patient's making bloody Urine in little Quantities, or Urine of the Colour of Mum after riding; then, in my Opinion, it will be much better for him, either wholly to omit Riding, or else to use it but very sparingly; for all violent Exercises, during the Existence of a Stone in the Bladder, encrease the Pain, exasperate the Symptoms, and endanger an Ulcer in that Organ: So that, in Cases of the Gravel only, much riding is certainly of great Service, and it's the best Exercise in the Management of all diuretick Medicines; for it greatly promotes and helps forwards their Operation, and so intimately mixes the Gravel with the Urine, that they are frequently discharged, in great Plenty, together.

OF all Things let me advise every Person troubled with either Stone or Gravel to avoid Bowling, as a most pernicious Exercise; for the bending of the Body, and the Stress that is laid upon the Kidneys and Bladder, upon

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the cast of the Bowl, does greatly injure those subject to this Disease: And all stooping Exercise does not only retard the Cure, but greatly promotes the Generation of Gravel; for the Nerves, Veins, and Arteries of those Organs, being somewhat relaxed in a stooping Posture, retard the Secretion of the Urine in the Kidneys affected, and give Time to the urinous Recrements to separate, unite, and form Gravel, or little Stones in these Organs: And tho' it may be objected, that a sitting Posture is attended with the same Danger; yet I answer, that in a sitting Posture, there is neither that stooping, nor that Force put upon the Parts, as in Bowling.

To this of Exercise I must subjoin the Use of Bathing: Dr. *Fuller* ranks the Cold Bath amongst his gymnastic Exercises, and lays great Stress upon it in the Cure of divers Diseases. Sir *John Floyer* has writ a whole Treatise upon the Advantage of cold Immersion; and Dr. *Baynard* seconds him upon the same Subject: Both these Authors prove it highly serviceable to the Body labouring under various Diseases: And, from Experience I speak it, that no Remedy so effectually promotes the passing of Stones, and gives so ready Relief in the nephritick Paroxysm, as warm Bathing; for by relaxing the Fibres of the Kidneys, and dilating the Passages, it greatly promotes the Discharge of

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Stones, that would not so easily pass without its Assistance: And after the Fits are over, and the Kidneys, Ureters, and Bladder cleared of all fabulous Concretions, nothing so effectually strengthens the Fibres of the foregoing Organs, and thereby prevents the Return of the Fits, as the Use of the Cold Bath; for it acts upon the Constitution by bracing the Solids, contracting the Fibres, and restoring the impaired Tone of the Kidneys: It also hath a peculiar Influence upon the Fluids, by fusing, dissolving, and thinning the viscid Juices: So that whoever is desirous of experimenting the Usefulness of the Cold Bath, in Cases of Gravel only, it will be best for him, in the Morning fasting, to plunge over Head; and to continue no longer under Water than he can bear to hold his Breath: For it is the first Shock that gives the most vigorous Contraction to all the muscular Fibres, whereby the due Tensity and Firmness of the Vessels are restored; and all Gravel and little Stones, from the Kidneys, Pelvis, and Bladder, not only evacuated with the Urine, but prevented from any future Concretions: So that while we are certain, it is only Gravel, the Cold Bath will be of singular Service; but I believe the Use of this Exercise will be better let alone after it is arrived to a

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confirmed Stone, and larger than can pass the urinary Passage; for under such Circumstances it can only raise a great Disturbance in the Bladder, without producing any good Effects.

I would advise no Gentleman labouring under this Malady of the Stone to sleep above six Hours, or seven at the most; and let him observe, that what Sleep is got before three in the Morning, is much more nourishing, than any he shall take after; and however the Slumbers may be more pleasing after that Period, yet they are not attended with that Advantage to the Constitution, which is the only Thing I am here concern'd for: For the Patient to go to Bed by ten of the Clock, and rise by four in the Summer; or at the same Hour, and rise by six in the Winter, is not only the most healthful to the Body, but also, when Custom hath made it habitual, the most pleasing to the Mind: But these Instructions I give with a Salvo to Persons in Years, and those of a weak, infirm Constitution, who may indulge in this sweet Repose a little longer.

LASTLY, Let him be careful of his Lodging, and lie upon Quilts rather than Feathers: A smooth hard Bed strengthens the Parts; whereas being sunk every Night in Feathers, softens the Organs, melts and dissolves

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solves the Firmness of the Nerves, and in particular heats and inflames the the tender Membranes of the Kidneys.

IN Relation to the Passions, let the Patient as much as possible, while under Cure, be compos'd to Mirth, and innocent Recreations; for Chearfulness of Spirit is the grand Character of a healthful Body. If, in Company, I behold a Man always chearful, I can, without an Oracle, pronounce him healthful.

Joy, Gladness, and the other exhilarating Passions, enliven the Heart, quicken the Motions, and facilitate the Secretions by the renal Glands; whereby the saline Corpuscles are kept at such a Distance from each other, as not easily to be brought within the Sphere of their Attraction. This vivifying Passion is indeed a Remedy of no mean Efficacy; and which may, in the properest Sense of the Word, be call'd a powerful Diuretick; for by contracting the Fibres of the Solids, it gives a placid, gentle, tho' swifter than ordinary, Motion to the Blood, whereby the Secretion of the several Juices are performed in less Time and greater Plenty than usual: So that under this agreeable Passion, we have not only a plentiful Secretion of the Bile, Saliva, &c. but, in particular, a plentiful Discharge of Urine; whereupon all unfriendly

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friendly Concretions of Gravel are prevented.

BUT if these Reasons be not strong enough to convince any Person of the Advantage of a chearful Disposition, let him, but on the contrary, observe how Grief and Sadness emaciate the Body, prey upon the Soul, and make a ghastly Look all over the Constitution; and Experience will convince him that what I have advanced, upon this Article of the Passions, hath much of Truth in it.

NOT that I would press upon any Man lying under the Torture of this Malady a composed Spirit: I know I may as well bid him die, as bid him be chearful when racked under the cruel Symptoms of a severe Fit of the Stone. All I aim at, by this Discourse, is to exhort him to bear up to Chearfulness, when Intermissions shall give him Respite from his Dolours; for few Men are so miserable, as to be always in Misery: If the Case be so desperate, then e're long he must of Necessity bid adieu to this World; for grievous acute Pains, and continual, cannot long be supported, but must daily impair the Strength, and break the Constitution; which sooner or later will put an End to his miserable Life and Distemper together.

CHAP.

C H A P. II.

Of the Force and Powers of Nature in assisting the Discharge of Stones and Gravel from both the Kidneys and Bladder.

BUT before we proceed to discover those practical Indications necessary to relieve the Symptoms of Stone and Gravel, and discharge these petrified Concretes from the Kidneys and Bladder, in case they are not too large to pass the Cavities of the foregoing Organs; I think it will be highly necessary, in the first Place, that we consider the Efforts and Powers of Nature; and the manner how she operates in righting these Organs, whenever they labour under the Pressure of either Stone or Gravel.

By Nature here I understand no more than those Laws, that the Sovereign Author of our Being, has established for the Defence and Security of Life and Health: This Security of Life and Health comprehends the Powers lodged in every Organ, for the attaining its natural Ends: The natural Ends of every Organ are to discharge its proper Function, which we call Health; so that whenever a Disease happens to any particular Organ of this animated System, that may endanger

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endanger the Health or Life of the Animal; all the other Organs, by a mechanical Necessity, immediately exert their respective Powers to free the affected Organ from its Pressure.

AND altho' all the Organs equally partake of these Conatus's or Efforts of Nature, as I have clearly demonstrated, in the sixteenth Page of the second Part of my Treatise of Consumptions; yet there was a great deal of Reason, why the Kidneys in a particular manner should be endowed with this self-restoring Power; for the saline Matter of the urinous Fluid continually flowing through their secerning Tubes must, from various Causes, have been liable to concrete and form Stones of divers Magnitudes, were it not, that their Fibres exert an extraordinary Effort for their Discharge: And these Efforts arise from the natural Elasticity or Springiness of the Fibres, that compose the Kidneys, whereby they are put upon this mechanical Necessity, to dislodge any fabulous Concretions, that attempt to lodge in the Cavities of their Canals.

This Power of Nature was so visibly efficacious in the Cure of most Diseases, that the great *Hippocrates* did little more than stand by and observe the mighty Effects of her Operations: And this was the Reason
why

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why that great Physician did conclude, that such extraordinary Phænomena never could arise from the mere Laws of inanimate Matter; and therefore did believe that there was some invifible Intelligence or animated Power refident in the feveral Organs, to affist their Action.

BUT we have little Reason to call in a preternatural Intelligence, to rectify the Disorders of the Body, fince it certainly appears, that the Solids and Fluids have a felf-reftoring Power lodged in their very Frame and Mechanifm; whereby they are neceffarily impelled to raife or fall their Motions, whenever affected with any imminent Preffure.

AND it will not here be foreign to our Purpose if I proceed to give fome Examples of this furprifing Power of Nature; I prefcribed for a Gentleman labouring under a fevere Fit of the Stone in the Kidney the following Mixture.

*Rx Ol. Amygd. dulc. ʒj. Syr. Alb. ʒ vi.
f. Hauf. ſumat in Bß Cereviſiæ, quæ
vulgo dicitur Belch parum calidè.*

THIS Medicine, fimple as it may appear, in lefs than two Hours, forc'd off from the Kidneys a Stone above an Inch long, and near an Inch, in its Dimenſions of Thicknefs,

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ness, when all other Means had been tried in vain.

IN the course of my Practice I have known a vast Number of Stones discharged from the Bladder, which, both for their Length and Thickness, would scarce admit of Belief, had I not sufficient Vouchers in support of these Facts: And I now am possessed of a Letter from a Gentleman in *Leicestershire* that voided a Stone almost an Inch and a half long, and above an Inch about, only by taking the following Medicine.

R. Ol. Amygd. dulc. Syr. Alth. ana ʒj. Aq. Theriac. Suc. Limon. ana ʒʒ, f. Haust. sumendus Maneque Nocte quotidie.

THESE are plain Demonstrations of the Efficacy of Nature in assisting the Operation of Medicines; and I do not question, but that a vast Number of Remedies, which Authors have been pleased to dignify with the Title of *Stone-Breakers*; and of whose Success we have particular Instances, owed most of their specifick Virtue to a happy Hit; or their being given in a lucky Hour, when Nature, at the same Time, was busied in discharging the calculous Matter: The Medicine, conspiring with the Powers of Nature jointly, procured an Operation, that
neither

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neither of them separately could have effected; and which a Thousand After-trials may convince the Physician of the Inefficacy of the same Medicine, without the like Assistance from Nature, to help forward its Operation.

WE certainly are in Possession of the choicest Medicines, in all Cases of the Stone and Gravel (where these Concretes are not too large to pass the Cavities of the urinary Organs) could we but obviate some Particular Circumstances in their Application: Of these particular Circumstances, Time and Opportunity are none of the least considerable; and therefore we ought to be particularly careful in timing our Administration of Medicines, as well during the Extremity of the nephritick Paroxysm, as after the Intenseness of the Pain, Heat and Inflammation is over.

IN the nephritick Paroxysm, whether ~~our~~ Intention be to appease and quiet the Motion of the Stone, the Cause of the Symptoms; or relieve the affected Organs, by a Discharge of this Concrete, the Cause of the Disease, the most proper Time of Administration is the present: In these Cases we must not wait till the Morning, if called in the Evening, before we advise to bleed, if that Remedy is necessary, because that Time
is

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is generally judged the most seasonable for bleeding; but we must insist upon the present Opportunity, as the only proper Season where the Symptoms are extremely pressing, and such imminent Danger arises from Delay.

It is remarkable, that most Fits of the Stone, even as those of the Gout, happen either Spring or Fall; and these are undoubtedly the properest Seasons to attempt a Cure; because, at these Times, Nature exerts all her Powers to dislodge whatever may incumber the Action of the urinary Organs: And it is best for us, at such Times, to close in with the Endeavours of Nature, and give her all the Assistance we possibly can from Diet, Exercise, and the Application of the choicest Medicines.

HOWEVER, it is doubtless a very great Pleasure to the Physician, when he reflects, that Nature is always helping on his Side; and will often of her self, give considerable Relief, if she is not thwarted in her Endeavours either by Loads of Physick, or unseasonable Applications.

CHAP.

C H A P. III.

Of Relieving the Symptoms, in a nephritick Paroxysm, when there appears no evident Indications of the Stone's passing from the Kidneys to the Bladder.

HAVING observed, in the foregoing Chapter, how much the Powers of Nature assist in relieving the nephritick Paroxysm, I shall now proceed to discover the most proper Methods and Medicines, both to appease the Symptoms, and assuage the Violence of a Fit of the Stone in either Kidney: And I think it highly proper to make a Distinction between relieving the nephritick Paroxysm, where Nature does not give any evident Indications of the Stone's Passage, and that, wherein she evidences its Discharge, because, in these two Cases, the Administration of Remedies will be widely different.

Now, it appears, from the eighth Chapter of the first Part, that a Fit of the Stone, or the Exasperation of the Symptoms, arises from the greater Motion of the Stone or Gravel infesting the Kidneys, which jarring against their most sensible Fibres, excites Pain, Heat, and Inflammation; all which

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Symptoms

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Symptoms are the necessary Consequences of an over great Tension, in the Fibres of the foregoing Organs.

THESE Symptoms will continue so long, as the Causes continue to be exasperated. The great Heat, Pain, and Inflammation are Consequences of the Tension of the Fibres; and this Tension arises from the Motion and pointed Surface of the Stone; so that by aswaging or fixing the Motion of the Stone, that is, by obliging it to lie quiet, we take off from the Pain; and by softening and relaxing the Fibres, by gentle, cooling, opening Medicines, we abate their Tension, Heat, and Inflammation; that is, we perfectly relieve the Symptoms.

THOSE Gentlemen therefore, that are called to assist, in alleviating those distracting Pains, which frequently attend the Paroxysms of this Malady, ought well to weigh and consider what is most proper to be done; for it will require his most able Judgment to encounter all the Difficulties that sometimes arise in the Extremity of the Fit. To know how to abate the impending Symptoms by quieting the Motion of the Stone: When to use Diureticks to force it off from the Bosom of the Kidney: When Opiates are necessary to curb the over exalted Motion of the Blood: In what Cases Cardiacks, or the most generous

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rous Cordials, may be of Service to keep up the Vigour of the Nerves and Spirits: All these several Points must carefully be attended to, in relieving the several Symptoms, as they successively arise, and vex the Patient with intense Pains, causing extreme Heats, Fevers, Watchings, and not seldom Deliriums, attended with the most fatal Effects.

I wish I could prevail with those Gentlemen, that find in themselves an Inclination to Gravel and Stone, to attack the Distemper in the very Beginning; for certain I am, that, while this Disease is only in Embrio, and not perfectly formed, it may easily be removed by a right Regimen of Diet, and proper Application of Medicines; which cannot so well be effectuated, when length of Time, and the Accumulation of much Gravel, have damaged the Kidneys, and too much disconcerted the Texture of their secerning Tubes: And it is a sad and melancholy Reflection, that most People are averse to the Physician, till the Desperateness of their Case shall make his Presence necessary; and, when, at the same Time, he is least capable of serving the Patient to Purpose; that is, of relieving his Malady.

ONE great Misfortune incident to this Disease, is, that the Enemy seldom gives

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Warning of his Approach ; but steals upon the Patient unawares ; and very often gets Possession of the Kidneys before he betrays himself, or gives any Disturbance to the unhappy Sufferer.

THE first Symptom that attends the Gravel is most commonly a grinding Pain in the Back, with a Numbness about the right or left Kidney, according to the Seat of the the Disease. To this succeeds a Strangury, and Heat in making Urine. Some few Days after, a red, sandy Sediment cleaves to the Bottom and Sides of the Urinal. These Symptoms most certainly indicate Gravel about to affect those Parts.

IN such a Case let us consider the most proper Means to be used, in order to relieve the Organs of their present Pressure, and prevent the Return of the Disease. Immediately to fall upon a Course of Diureticks would be a very preposterous Practice, and might greatly endanger the Patient, by turning such a Load of Humours to the Kidneys, as would damm up the secretory Vessels, and cause an entire Suppression of Urine.

FIRST, then, we ought very carefully to examine the Age and Temperature of the Patient ; the Degrees of the Disease, and force of the Symptoms ; and consider whether Bleeding may not safely precede all other

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other curative Indications. In some Cases it seems absolutely necessary; especially where Inflammations affect the Kidneys, and great Heat and Thirst, with a Fever, oppresses the Habet. Under these Circumstances, to extract 10 or 12 Ounces of Blood may be of great Service, as that Evacuation is known to abate the Inflammation, assuage the Heat and Thirst; and appease the other Symptoms of a Fever.

AFTER that Operation is over, we ought to consult upon the Choice of Medicines most properly adapted to relieve the Patient under his present Indisposition; and I am of Opinion, that a gentle Vemir, to clear the Stomach of that Load of Phlegm, which often hinders Digestion, may sometimes be of singular Service: Certainly to those of gross phlegmatick Constitutions, and in Cases where the Symptoms are rather uneasy than painful, this way of proceeding will be highly proper; but gentle Catharticks, mild Lenitives, and emollient Clysters I should much prefer, to those of weaker Constitutions; for these gently cool the Body, and allay the Heats and febrile Commotions, that greatly disorder the Patient under a Fit of the Stone; and which are much exasperated, by all Medicines of a violent or harsh Operation. And this re-

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member, that neither Vomits, nor the stronger Purges are ever proper, while Pain continues to distress the Parts: For the first Process I should prefer the following, because the Pain, while the Gravel or Stone continues lodged in the Substance of the Kidney, is never extremely sensible.

Fiat Venæ Sectio in Brachio & detrahantur Sanguinis ℥x.

℞ Pulv. Rad. Ipecacoan. ʒi. Sal. Vitriol. ʒss. Aq. Card. Benedict. ʒi. Syr. Viol. ʒss. Aq. Peon. c. ʒiii. f. Haust. vomitor. Hora idonea sumendus, superbib. copiose jusculi avenacei inter vomendum.

OR, if Vomits be judged improper from the Pressure of the Symptoms, then let the following Potion be given instead of the Vomit.

℞ Fol. Senn. ʒi. Rhei incis. ʒss. Rad. Glycyrrhiz. ʒi. sem. fœnic. dulc. ʒss. Sal. Genist. ʒi. Coq. in Aq. Epsom. ℔ss ad ʒiv. Colat. cui adde Man. opt. dis. ʒi. Elix. Salut. ʒss f. Haust. mane sumendus.

IN those more advanced in Years, I have known fifteen Grains to a Scruple of Calomel taken over Night to prepare the Humours,

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Humours, give great Relief. What I mean here by preparing the Humours, is to dilute the grosser Phlegm, which greatly abounds in old People, and renders it more fluxile: And truly this way of preparing the Humours, tho' an ancient Practice, is not to be despised, if advised in a right Manner, and at proper Seasons.

BUT I must confess, that the Method of the Antients was not capable of answering their Intentions; for in their Practice of preparing the Humours for Evacuation, a few inciding Syrups were commonly ordered a Night or two preceding a Purge; which, what Influence they could have in disposing the Humours to a more plentiful Discharge, any Man, but meanly versed in the Knowledge of Medicines and their Operation, may easily conceive: But Mercurius Dulcis, or its Offspring Calomel, gives to the tenacious viscid Phlegm a greater Fluidity, by dissolving its Texture, and diluting it with the serous Lymph spued out of the Glands of the Stomach, Intestines and Mesentery, which it chiefly affects; and therefore in slight Inflammations of the Kidneys, when the Symptoms are not extremely painful, I should prefer the following Prescription to all other Administrations.

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℞ *Calomel. Gr. xvi. Elect. Lenitiv. q. f.*
f. Bol. Hora somni sumendus.

℞ *Aq. Epsom. ℥iii. Coq. ad ℥ii. cui adde*
Mann. dis. ʒi. Nuc. Mos. incis. ʒi. f.
Apozema: bibat ℥ss. omni quadrante
Horæ primo Mane.

AT Night, after the preceding Evacu-
 ations, I always take care to secure the
 Tranquillity of the Spirits by gentle Ano-
 dynes.

℞ *Aq. Paralyf. Ol. Amigd. Dulc. Aq. Ne-*
pbritic. ana ʒvi. Syr. e Mecon. ʒß. Laud.
Liquid. gutt. 15. f. Haust. Hora somni
sumendus.

THE next Day, if a Tenderness remain
 upon the Parts, and he perceives any Symp-
 toms of a Strangury to affect him, I would
 advise the following.

℞ *Sperm. Cæti ʒß. Oc. cancr. pptt. ʒß. sal.*
Prunel. Gr. vi. Syr. Violar. q. f. f. Bol.
6ta quaque Hora: Sumendus superbib.
Haust. sequent. Emulsionis.

℞ *Amigd. Dulc. excort. ʒß. sem. Lactuc.*
ʒiii. sem. Papaver. Alb. ʒii. contund. in
Mort. Marm. sensim affund. Aq. Hord.
℥iß. cui adde Aq. Nephritic. Dr. Rat-
cliff ℥ß Sacchar alb. ʒß. f. Emulsio. IF

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IF the Pain increafe, and become very violent, let him take the following Draught.

℞ *Aq. Nephritic. Ol. Amigd. Dulc. ana*
℥℥. Syr. Alth. ℥℥ Pil. Matth. gr. viii. f.
Haust. statim sumendus & repet. medio
Noctis, si dolor non prius leniatur.

IN all Inflammations of the Kidneys and Viscera oleaginous Clysters are of singular Service. They lubricate the Passages, give an easier Descent to the Excrements, and both cool the Body, and abate the Inflammation of the Parts.

℞ *seri Laët. Ol. Lin. com. ana ℥vi. Syr.*
Violar. ℥iiss. f. Enema statim injiciatur
& repet. pro re nata.

BUT here I cannot omit a very remarkable Case; It is of an intermittent Fever, whose Paroxysms were seated in the Kidneys, and kept their Intermiſſions and Returns as exact, as the most regular Intermittent, I ever had under my Care. The Symptoms were a Strangury with Heat in making Water, and a heavy dull Pain about the Region of the Loins; to which succeeded Retchings and a Vomiting, which as constantly attended, as the Fits returned:
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These Symptoms were followed with a Discharge of small Quantities of slimy Urine intermixed with a little Gravel. I ordered him several diuretick Medicines with little or no Effect; at last I prescribed the following, which gave him great Relief.

IN all intermittent Pains we must distinguish between removing the Fits and curing the Disease; and therefore to prevent the Return of the Fit, or at least to break its Force, that it might not return with that Violence, it usually had done before, I prescribed him the following Febrifuge, to be taken two Hours before the Time it was expected.

℞ *Aq. Mentb.* ℥ii. *Aq. Theriacal.* 3vi. *Spir. Vitriol. gutt.* xvi. *Sal. Absynth.* ℥i. *Ol. Absynth. gutt.* i. *Syr. Croc.* 3iii. *f. Haust.*

AND to support the Spirits under the Conflict I prescribed the following.

℞ *Pulv. Lapid. de Goa* gr. xii. *Pulv. Croc.* gr. vi. *Camphoræ* gr. iv. *Ol. Nuc. Moschat. gutt.* i. *Confect. Rawleghan.* 3℥. *Syr. Alth. q. s. f. Bol. quarta quaque Hora sumendus urgente Paroxysmo; superbib. Cochlear. quatuor sequent.*

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℞ *Aq. Lact.* ℥vi. *Aq. Nephrific.* Dr. *Ratclif.* ℥iv. *Aq. Rosar. Damas.* ℥i. *Sacchar. perlat.* ℥iii. *f. Julap.*

AND then compleated the Cure with the following Pills and Febrifuge Infusion.

℞ *Extract. Cortic. Peruv.* ℥iiss. *Terebinth. è Chio* ℥i. *Resin. Cortic. Peru* ℥i. *Balsam. Peru. Camphor. Croc. ana* ℥ss *Syr. Alth. q. s. f. Pill. è* ℥i. *Nº. x de quibus sumat quinque dosi, 4ta quaque Hora cum Haustu sequent.*

℞ *Salv. Horten. Mj. Limon. cum Cortic. in tenuissimas Taleolas concis.* *Nº i. Sacch. Alb. refin.* ℥i. *Cochinel. Pulv.* ℥i. *supra affund. Aq. bullient.* ℔iii. *Stent. in Infusione per Horas quatuor, et cum frigida fuerit colat. cui adde Vin. alb. Mont.* ℔ss. *Spir. Nitr. dulc.* ℥i. *f. Apozema.*

WHEN Symptoms of the Gravel or Stone affect Persons subject to the Spleen or Vapours, we must be highly careful to administer Volatile Salts as the Basis of a Remedy; and the following I prefer to all others in these Cases.

℞ *Sal. vol. Ol. gut xx. Sal. vol. Corn. Cerv. Sal. Ammoniac. vol. ana gr. vi. Vin. Canarin.*

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narin ℥iiss. *Syr. Alth.* ℥ss. *f. Haust.*
omni Mane, duabus Horis ante Prandium,
& Hora 5ta Vesperi sumendus.

℞ *Ol. Amigd. dulc. Aq. Nephritic. ana*
℥vi. Sal. vol. Ol. Spir. Lavend. c. ana
gutt. xx. Syr. è Mecon. ℥ss. f. Haust. hora
somn. sumendus.

THESE Medicines not only appease the Symptoms, and assuage the Motion of the Stone, but also enliven the Animal Faculties, and give a Briskness to the Spirits, in respect to the present Disorders of the Spleen and Vapours: And this we ought carefully to observe, that where two or more Distempers are complicated in one Body, whether the Remedies intended to relieve the one, may not greatly prejudice the other: Thus to bleed or briskly purge a melancholy or hippish Patient labouring under the Symptoms of Gravel, commonly infers great Disorders, by putting the Nerves and Spirits into a Hurry. In this Case we ought to begin with gentle Anodynes, which curb the unruly Disorders, strengthen the Spirits, and restore the Nerves; and if Evacuations be necessary, they ought to be managed with gentle Laxatives and emollient Clysters.

IN complicated Cases, as in the nephritic Cholick, that is, when Wind disturbs
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the Intestines, at the same Time that Gravel or little Stones the Kidneys, I have prescribed the following Medicines with great Benefit to the Patient.

℞ *Tinct. Sacr.* ℥ii. *Ol. Amygd. Dulc.* ℥ss
Syr. Rosar. ℥ss. *Spir. Nitr. dulc. gutt.*
 xxvi. *f. Haust. statim sumendus.*

THIS is of singular Service in windy Habits; but if the Constitution be cold and phlegmatick, and no Inflammation affect the foregoing Parts, I should prefer the following.

℞ *Elix. Nephritic. ad finem hujus Libri præscript.* *Ol. Lin. recenter express. ana* ℥iss.
Syr. Rosar. solut. ℥ss. *f. Haust.*

BUT if, in three Hours after taking either of the foregoing Medicines, the Body does not answer by Stool, then let the following Clyster be injected.

℞ *Decoct. Com. pro Enemat.* ℔ss *Terebinth. Venet. in Vitell. Ovi dis.* ℥vi. *Elect. de Bac. Laur.* ℥iss. *Ol. Lin. Com.* ℥iv. *Mell. Volar.* ℥ii. *Sal. Com.* ℥ss. *f. Enema pro re nata injiciendum.*

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IN the mean Time let the Patient drink Camomile Tea, or Poffet Drink, with a few Camomile Flowers infused, which often proves of great Efficacy.

WHEN the Patient has been for a considerable Time affected with a dull, heavy Pain about the Region of the Loins, and subject to frequent Retchings and Vomitings after his Repasts, there is great Reason to conclude that the Stone is lodged in the Substance of the Kidney, and is larger than can pass the Ureter; in this Case it will be dangerous to administer any of the stronger diuretick Medicines, for fear of forcing it out of its Seat, which might bring on a Fit of fatal Consequence to the Patient: And seeing we have no certain Diagnosticks to discover the particular Bulk of the Stone in the Substance of the Kidney; so I think it will be the safest way to leave it to the Disposal of Nature, who is generally solicitous to relieve her self of the Pressure, by a Discharge of the Stone, before it arrive at too great a Bulk to pass the Ureter: However, let him avoid riding, and every other Exercise, that, by its Jolting, may oblige the Stone to change its Seat; for if it once falls into the Ureter, only Death or a Passage can relieve him of his most torturing Misery.

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WHILE the Stone therefore continues seated in the Substance of the Kidney, the following I should advise as preferable to all other Administrations.

℞ *Cassia recenter extract.* ℥i. *per se, sumat bis in septimana; si Alvus non sponte semel vel bis in Die responderit.*

℞ *Aq. Sperm. Ranar.* ℥iiiss. *Aq. Limac. Magist.* ℥ss. *Syr. Violar.* ℥ss. *Spir. Vitriol. gutt.* xii. *f. Haust. omni Mane sumendus.*

℞ *Aq. Sperm. Ran.* ℥iii. *Aq. Limac. Magist.* ℥ss. *Syr. Papaver. erratic.* ℥ iii. *Spir. Vitriol. gutt.* xii. *f. Haust. Hora som. quotidie sumendus.*

AND these I have thought the most proper Administrations in all Cases, where a Stone or Gravel is lodged in the Kidneys, and evidences no Indications of its Passage; for few Stones in the foregoing Organs are attended with any great Pains; nay it is certain, that considerable large Stones may lie in the Bosom of the Kidney for several Years, without producing any great Inconveniences: And this arises from the few Nerves, that are disposed in the Substance of the Kidneys, whereby these Organs are less sensibly affected with the Impression of those Objects that infest them.

CHAP.

C H A P. IV.

Of Relieving the Pain, Heat, and other Symptoms, that affect the Patient, in the Passage of Gravel or Stones, from either Kidney to the Bladder.

THUS far in Relief of the Symptoms of Gravel and Stones, arising from an Exasperation of the Causes, when there appear no sensible Marks of their Passage, from the Kidneys to the Bladder; I shall now proceed to discover the curative Indications most proper to discharge Gravel and little Stones, from the foregoing Organs, seeing that these small Concretes require a different Management, from those that are larger, which must undergo a Dissolution, or Diminution of Parts to fit them for their Passage.

INDEED, we observe most People, after the first Fit is over, and the Stone made quiet, very unwilling to undergo any further Attempts, for fear of disturbing the Stone; and being put to some little Inconveniency of Pain; when certainly it is much more easy to discharge these little Stones, while they continue little, and capable of passing, than when length of Time, Largeness of the Stone, and

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and Violence of the Symptoms shall render it dangerous to attempt a Passage.

BUT here a very material Question offers it self to our Consideration, and that is, by what Symptoms, Marks and Tokens, shall we discover this Disposition in the Stone to pass? To this I answer, that we shall easily discover in the Stone an Inclination to pass from a Change in the Pain of the Parts affected; for if the Pain be dull, heavy, and fixed, it is a certain Indication that the Stone settles in that Place, and is not disposed to move.

BUT, from a Change of Pain, we justly infer, that the Stone has changed its Seat; and therefore if the Pain become more sharp, acute, and sensible, it is a strong Presumption, that the Stone is come forward, has broke through the *Carunculæ Papillares*, and takes its way towards the Bladder: In this Case it is not in our Power to determine the Motion of the Stone; for pass it must; and our Business, is to give all the Assistance we can; that, in its Passage through the Cavity of the Ureter, it may not fret, or tear off the fine Mucous Coat, that lines the inner Surface of this Organ, and fences it against the Acrimony of the Urine.

THERE are three curative Indications, most proper to be put in Practice, in order to effectuate the safe Passage of Stones from

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the Kidneys to the Bladder: First, to fence the tender Membranes of the Pelvis and Ureters, from the Impression of the Roughness and irregular Surface of the Stone. Secondly, To administer those Medicines, that are most proper to dislodge the Stone, and evacuate all fabulous Concretions from the Kidneys: And, thirdly, To brace, strengthen, and restore the foregoing Organs, in such a manner, that they may prevent the Generation of all Gravel and Stones for the future.

IN the Management of the first Intention, great Care must be taken to fortify the Mucus of the Pelvis, Ureters, and Bladder, against the Asperities of the Stone: And for this Reason, when I intend to discharge a Stone, lodged in either Kidney, I always prescribe the following Remedies to precede all diuretick Courses, three or four Days, or some times a Week, as the most fitting Means, to fence the Mucus, smoothe the Parts, and make the Stone slide easy through the Ureter.

℞ Gum. Tragacanth. ℥i. Aq. Rosar. Damas. ℥vi. ℥iv. Nuc. Moschat. ℥ii. Sacchar. Alb. ℥vi. Misce, & f. Mucilago in-
star Eleſtuarii, cujus ſumat Cochleare lar-
gum ſingulo Mane, horis duobus ante Pran-
dium, Hora 5ta poſt Meridiem, & Hora
ſom. cum ℥ss. ſequent. ℞ Aq.

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℞ *Aq. Malvæ* ℥ii. *Syr. Violar.* ℥ii. *Spir.*
Nitr. dulc. ℥ii. *f. Julap.*

THESE are admirable Medicines, to prevent the Stone in its Passage, from tearing the Mucus off from the Pelvis, Ureters, and Bladder.

As to the Second Intention: After the Kidneys, Ureters and Bladder are thus well guarded by proper Medicines against those Accidents, that may happen from the Motion of the Stone, and the Roughness and Asperities of its Surface; we may then proceed with Boldness to attack the Enemy in his Intrenchments, and force him off from his strong Holds: In the Beginning it will be best to use gentle Methods, till we see whether the Stone will be brought to pass with Ease or not; for as all or most Stones, lodged in the Kidneys, are of a soft, spongy Nature, and rugged, and uneven in their Surfaces; so will it be next to an Impossibility, that even small Stones can pass, without somewhat enlarging the Diameters of the Ureters, above their natural Dimensions, whereby those Parts will be put to some little Uneasiness and Pain.

IN the Beginning, if the Patient be of a sanguine Constitution, and a Redundancy of Blood appears in the Vessels, I hold it

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highly necessary, that the Patient lose eight or ten Ounces of Blood; for certain I am, that nothing so powerfully furthers the Operation of diuretick Medicines as Bleeding; for it fuses not only the Blood it self, but the other Humors depending on the Secretion of that Fluid: After Bleeding, if the Body is subject to be costive, let gentle Catharticks be prescribed; the following of all others is preferable, when we intend the Passage of a Stone.

℞ *Mannæ opt.* ʒiſs. *dissolv. in Aq. Epsom.*
℔iij. & coque ad ℔ii. deinde injice Nuc.
Mosch. pulv. ʒi. f. Apozema: Sumat
℔ss. omni quadrante Horæ.

BUT, for as much as all Stones, that are larger than can well pass, excite great Pains, and these Pains a Tension of the Fibres, that compose the Pelvis and Ureters, whereby their Cavities are straiter and narrower than is consistent with their natural Dimensions, and consequently less capable of admitting a Stone to pass; it will be necessary therefore, in order to oblige a Stone to pass a Cavity that it could not pass before, either to lessen the Dimensions of the Stone, or enlarge the Cavity of the Vessel through which it is to make its Way: To lessen the Dimensions of the Stone, is to divide or break the Cohesions

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sions of its Corpuscles, which will not always be a proper Method of Practice, under these Circumstances, for fear of exciting an Inflammation: The most successful way therefore will be, to enlarge the Cavity of the Pelvis and Ureter; whereby the Stone may pass with a less Force and Resistance; and the most proper Method to effect this Intention, is to supple their Membranes, relax their Fibres, and take off from their over great Tension: And nothing so effectually answers these Ends and Purposes, as softening, lubricating Oils, Balsamick Medicines, and such as cool and gently relax the Body: Such are Oil of Almonds, Oil of Nuts, Syrup of Marshmallows, of Maiden Hair and Balsam; cooling Emulsions extracted from blanched Almonds and the cold Seeds; cooling, opening Electuaries of Cassia, lenitive Electuary, and Manna; drinking large Quantities of Barley Water or thin Water Gruel sweetened with Honey.

THUS far in Support of the Measures necessary to prepare the urinary Organs for the Stone to pass: The Passage of this Concrete, in case it does not naturally incline to pass, will demand the Assistance of a Force: For the Difference between discharging of Stones from the Kidneys, and appeasing the Symptoms under a Fit, is, that in the former

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Case we must always add Medicines, that act by their Weight, to oblige the Stone to descend with the greater Readiness; while in the latter Case we must attempt to quiet the Motions of the Stone by gentle Anodynes mixed with Balsamicks; tho', in some Cases, where the Motions are highly exasperated, and the Pain insufferable, we are obliged to have recourse to the strongest Narcoticks.

To facilitate the Stone's Passage, I know nothing more effectual than the following mercurial Preparation.

℞ *Calomel. ʒj. Extract. Cassiæ ʒii. Crem. Tart. Gr. xii. Laud. Lond. Gr. i. f. Bol. sumendus statim superbibend. Haust. sequent.*
 ℞ *Mell. Virg. ʒiʒ. dissolve in jusculi avenacii ten. ℥ʒ. et fiat Haust.*

THESE Medicines increase the Separations and Secretions of the Fluids by the urinary Organs, whereby they fall with a greater Impetus upon the Stone impacted in the Ureter, break its Cohesions, and oblige it to descend more readily into the Bladder.

WITH the following Medicines I have passed an incredible Number of Stones from the Kidneys; and scarce ever knew these fail in relieving the Patient by a Discharge of these Concretes.

℞ *Pulv.*

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℞ *Pulv. Test. Limac. Pulv. Rad. Alth.*
ana ʒ℥. Sal. Prunel. Gr. xii. Croc. Gr.
iv. f. Pulv. Sumat Maneque Nocte su-
perbib. ℥℥. Lact. Amigd.

WITH the following I passed several Stones from my Father, after he was upwards of seventy Years of Age.

℞ *Sal. Tart. ʒi. Entis Ven. ʒ℥. Aq. Juniperi*
ʒiii. Pill. Matth. Gr. vi. Aq. Fabar. ʒiss.
Syr. Papaver. erratic. Ol. Amigd. dulc. ana
ʒss. f. Haust. singula Nocte sumendus.
Mane seq. sumat Cochlear. iii. Elix. Ne-
phritic. in Appendice hujus Libri descript.

THESE Medicines he continued Spring and Fall for a Month with some Intervals, and had great Relief from their Assistance.

I have known great Success from the following Terebinthinated Medicine.

℞ *Terebinth. è Chio ʒ℥. Oc. Cancr. pptt.*
Pulv. Test. Limac. ana ʒi℥. Sal. Vol. Suc.
Croc. Pulv. ana ʒss. Bals. Peru ʒi. f.
Pill. è ʒi. N^o xii. de quibus sumat quatuor
omni Mane, hora 5^a Pomerid. & Hora
somn. superbib. ʒvi. sequent.

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- ℞ *Decoct. ex Incred. P. Syr. Alth. ℥iiss. Aq. Nephritic. ℥vi. Mell. elect. ℥ii. Spir. Nitr. dulc. ℥ii. f. Apozema. Vel;*
 ℞ *Pulv. Gum. Guajac. ℥ss. Mell. ℥iiß. Sal. Prunel. ℥iß. Croc. Pulv. ʒi. f. Elect. de quo sumat quant. Nuc. Moschat. major tribus Horis Medic. superbib. ℥ss. sequent.*
 ℞ *Jusculi avenacii tenuis ℥ss. Mell. Opt. ℥iß, f. Haust.*

THE following is as efficacious a diuretick Alterative in all Cases, where we intend to pass Gravel or Stones from the Kidneys, as can be prescribed.

- ℞ *Cinner. Vitis Milleped. pptt. ana ʒi. Sal. Volat. succin. ʒii. Croc. Pulv. ʒß. Pulv. Camomel. ʒi. Camphor. ʒss. f. Pulv. Dos. ʒss. in Haust. jusculi avenacii omni Mane & Hora somni.*

SOMETIMES it happens, that the Stone in its Passage fixes in the Ureter, and can neither be brought back, nor driven forwards into the Bladder; whereupon the Patient is racked with the most excruciating Pains, it is possible for human Nature to groan under: Under these dreadful Circumstances is the Advice of the Physician most necessary, but
 least

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least available; the miserable Patient loudly complaining, and earnestly desiring Ease, but cannot obtain it. In this Case I shall communicate a most approved Prescription; and with which Remedies I relieved the Patient, after Convulsions had seized the Brain, from the racking Torture of the Symptoms.

- Mittat. Sanguis è Brachio ad ℥xii.*
 ℞ Ol. Lin. C. Elix. Salut. ana ℥vi. Syr.
de Spin. Cervin. ℥iiss. Ol. Junip. ℥ss. f.
Enema statim injiciendum.
 ℞ Pill. Matth. Gr. xv. ad ℥i. dissolv. in
Spir. Juniper. ℥ss. cui adde Aq. Puleg. ℥vi.
Spir. Nitr. dulc. ℥i. Syr. Alth. ℥iiss. f.
Haust. statim sumendus.
 ℞ Aq. Theriacal. Aq. Nephritic. in Ap-
pend. hujus Libri præscript. Aq. Menth.
ana ℥iiss Tinct. Croc. Vin. Can. fact. ℥iss.
Spir. Lavend. C. Tinct. Castor ana ℥ii.
Syr. è Mecon. ℥i. f. Mixtura Cardiac.
Sumat Cochlear. iii. 3tia quaque Hora,
sevientem Dolore.
 ℞. Phylon. Rom. ℥ii. Castor. Rus. Sal. Vol.
succin. ana Gr. vi. Confect. Alkerm. q. s.
f. Bol. Hora somn. sumendus.

AND to enlarge the Cavity of the Ureter
 for an easier Passage to the Stone, I ordered
 the

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the pained Parts to be fomented with warm Stupes wrung out of a Decoction of Marsh Mallows and Camomel Flowers; after which to bathe them with the following linifying Liniment.

*Rx Ol. Amigd. dulc. Unguent. Dialth. ana
℥ii. Ol. Lill. Camomel. ana ℥vi. Ol.
Camphor. ℥ss. f. Linimentum Part.
dolenti tepide applicand. sæpius in Die.*

IN the former Editions it was to be applied often in the Day, but since that Time I have met with several Cases, where I was obliged to order it to be applied every quarter of an Hour.

THESE Medicines were intended to strengthen the Heart, fortify the Brain, and support the Spirits under that racking Torture and dismal Conflict; to encrease the Velocity of the Blood's Motion in its several Circulations, that the Secretions of the Serum by the Tubuli urinarii might be performed with a greater Impetus, which falling upon the Stone with a greater Weight, might happily protrude it into the Bladder: And, unless it be effected by this Means, I see no Hopes but that of Necessity, the Patient must very speedily change this Life for another: While the Symptoms continue

2

extremely

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extremely painful be careful, to repeat Clysters often, and those as warm as the Bowels can well bear.

THE following is a Medicine I have made use of, in Practice, under the most racking Pains with very great Success.

℞ *Spir. Terebinth. Ætherial.* ʒiss. *Ol. Nuc. Moschat. veri gutt.* xii. *Laud. liquid. gutt.* xxx. *Mel. Virg.* ʒiii. *dis. in Vin. Alb. Gallic.* ʒiiss. & *f. Haust. sumendus in Extremitate Doloris; & repet. post tres Horas, si Dolor non prius leniatur.*

LET none be surprized, that I am so bold, as to prescribe so large a Dose of *Matthew's Pill*, and of the *Laud. Liquid.* since I have known these very Quantities given, and obliged to be given, where the Pains were extremely racking, in order to reduce the expirated Motions within their proper Bounds again: But beware, lest from an over liberal Use of Opiates, only necessary from the Dreadfulness of the Symptoms, that a Constiveness does not ensue: And therefore be highly careful to guard against that Inconveniency by the frequent Administration of Oily Clysters, that gently assist in quieting the Pain.

BUT if, in the Conflict, the Stone force its way through the Ureter; and so descends
into

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into the Bladder, then, the next Point, that comes under Consideration, is to examin what Accidents may have happened to the Pelvis and Ureter in its Passage; and if bloody Urine be excerned, and Flakes or Filaments, like the thin Parings of Leather come away some little Time after, there is great Reason to fear an Inflammation, if not a Laceration of the Ureter: And this more so if the Pain be very acute, after the Descent of the Stone.

IN this Case, all balsamick and oleose Medicines greatly avail: They not only aswage Pain, and abate the Inflammation; but, by their healing Particles conveyed to the Urine, do so sheath its sharp Salts, that they are in a great Measure deprived of their fretting Quality: So that in all grievous Paroxysms, where the Pain is lancinating, or as it were cutting with Knives, I would commend their Use to Practice: Neither do I conceive, that any Symptoms can arise, that may render them unsafe to be given.

Rx. Vin. alb. Aq. Lact. alex. ana ℥i. Sperm. Cæti in Vitel. ovi diss. ʒiss. Balsam. Capiv. gutt. xii. Laud. Liquid. gutt. xvi. Syr. è Mecon ʒiii. f. Haust singula nocte sumendus.

Rx. Vin.

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℞ *Vin. Alb. Aq. Laët. alex. ana ℥i. Sperm. Cæti ℥i℥ Balsam. Capivi ℥i. Syr. Balsam. ℥iii. f. Haust. omni Mane & Hora 5ta post Meridiem sumendus.*

AND to digest, mundify, and incarn the Ulcer, if such there happen, I would advise him to go on with the following Pills and Emulsion.

℞ *Terebinth. è Chyo ℥iii. Olib. ppt. Oc. Canc. ppt. Pulv. Haly ana ℥i. Bals. Peruv. Croc. Pulv. ana ℥℥ Camphor. ℥i. cum q. s. Tinēt. Myrrh. f. Pill. exiguae, quarum 5que sumat dosi Maneque Nocte, superbib. Haust. Emulsionis sequent.*

℞ *Rad. Symphit. ℥i℥ Fol. Malv. Mi. Coque in Aq. Hord. ℥iii. ad ℥ii. Col.*

℞ *Amigd. dulc. ℥i. Sem. Papaver. alb. ℥vi. Sach. Alb. ℥ss. contunde quam optime in Mortario Marmor. sensim affund. Aq. Hord. suprapræscript. & f. Emulso.*

AND these are the practical Indications and Remedies most proper to assist the Discharge of little Stones and Gravel from the Kidneys.

AND now after we have sufficiently cleared the Kidneys of all fabulous Concretions that infest these Organs, and obstruct their Secretions;

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cretions; it will be highly necessary, that the Patient wind up the Cure with a Course of Medicines, that may strengthen the Kidneys, brace up their over lax Fibres, and restore their Tone, whereby all future Generations of fabulous Matter will be prevented: And nothing so effectually answers these Intentions as the following.

R Cortic. Peruv. crassiusculè Contus. ʒi. Balsam. Tolu ʒiii. Cochin. ʒi. Sal. Tart. ʒiʒ Coque in Aq. calc. ʒiʒ. ad ʒxii. Colat. cui adde Aq. Cin. fort. ʒiii. Spir. Nitr. dulc. ʒiʒ. f. infus.umat Cochlear. vi. Mane, Hora 5ta post Meridiem, & Hora somni.

IN the mean time I would advise him, by all Means, to pursue a Course of the Mineral Waters: Of all which the Chalybeat will be preferable, especially in Affections of the Kidneys or Bladder: If the Patient consult his Conveniency; and his Business will not permit him to be far from *London*, the *Islington* Waters called new *Tunbridge Wells*, will be most proper for his Use. They, besides the Steel they are strongly impregnated with, contain a bituminous Asphaltum, which renders them very balsamick and healing in all Ulcers of the Lungs, Stomach and Bladder.

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THEY resolve all tartarous Slime, that afford Matter for the Generation of the Stone and Gravel; and purge off by Urine those sharp, scorbutick Salts, that adhere to the Extremities of the Vessels, and crowd the Body with Obstructions: In order to drink these Waters with Success, it's highly necessary that the Body should be properly prepared for their Reception.

I would advise the Patient as much as possible to live upon Milk Meats; for they are Aliments of excellent Nourishment, and very efficacious in restoring the impaired Digestions: Besides Milk is an Anodyne, and by its mild, soft Qualities proves very lubricating to all the urinary Passages. I should prefer it crude, as it comes from the Cow, before all other ways of Preparation; for new Milk relaxes, and keeps the Body soluble, which is of considerable Advantage, where such Damages ensue from the Body's being costive; and to which most are subject, that suffer under either Stone or Gravel.

GENTLE Riding I would recommend to the Patient as an Exercise of singular Efficacy in all Cases, when we have got the Organs clear of the Disease; for it resolves the Obstructions of the Stomach and other Viscera, facilitates the Secretions by the Kidneys,

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neys, and prevents the Corpuscles of saline Matter, from coming into too close Contacts with each other; whereby the Generation of these fabulous Concretions are prevented.

I would, to complete the Cure, advise a discreet Use of the Cold Bath: A Remedy second to none by way of Prevention; for as both Stone and Gravel owe their Origin to an over relaxed Tone of the Kidneys or Bladder; so those Remedies that brace and restore the impaired Tone of the foresaid Organs must be confess'd to have the greatest Influence, in the Cure of those Affections: Therefore, let the Patient observe, in the Use of this Exercise, suddenly to plunge in over Head, and to hasten out, as soon as he rises with his Head above Water again; for it is the first Shock, that gives the greatest Contraction to all the muscular and vascular System; and by shortening our Stay in the Water, we, in a great Measure, prevent the Influence of its relaxing Properties upon the Body.

BUT, tho' this is as general and extensive a Remedy, as any in Physick, yet it is not without its particular Exceptions; and may, in many Cases, be used to the great Detriment of the Patient: For it is never proper for thin, lean, emaciated Bodies; nor those extremely corpulent;

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pulent, or that are subject to Asthmatical Affections; because, it too much fuses the Blood in the former, it may be, already too much fused; and endangers the latter by a too sudden Rarefaction of the Humors, whereby the Blood, equally recoiling to the Heart and Breast, threatens a Suffocation: It may also prove of fatal Consequence to those, that labour under Ulcers of the Lungs, Kidneys or Bladder; or are subject to a confirmed Stone in any of the foregoing Organs; and therefore such ought absolutely to refrain its Use.



C H A P. V.

Arguments in Defence of the Operation of Nephrotomy; wherein is demonstrated the Possibility of cutting into the Kidney, through the Back, for the Extraction of the Stone; when it is too large to pass, too hard to be dissolved, and occasions Pains above the Strength of human Nature.

BUT sometimes it happens, that a Stone is lodged in the Kidney, too large to pass, too hard to be dissolved; and which occasions Pains above the Strength of human Nature: Under these deplorable Circumstances is there no way to rid the miserable Patient of his Thralldom; no Solace or Comfort to be expected from the Assistance of the healing Art? No Operation that may procure a Discharge of this painful Concrete with Safety to his Life? For my own Part, I must answer in the Affirmative; and am persuaded, that the Operation of Nephrotomy, practised, more than once, with Success, will afford Relief, even in this very Case, hitherto by all given over as incurable.

HOWEVER, it is impossible to attempt to introduce any new Experiment or Operation, in either Physick or Surgery, but what
I must

must expect to meet with Opposers, who doubtless will demand Facts, as Vouchers of its Success; or at least Authorities, that may oblige them to believe, that the Operation has been put in Practice before; and may again be undertaken with Safety to the Patient: I shall therefore, in Compliance with these Gentlemen, produce two unexceptionable Facts, as Vouchers of the Possibility of cutting into the Kidney for the Extraction of a Stone lodged in that Organ; and which I think will at least demonstrate the Success of making the Experiment.

A State of the first Factum, as related by the late learned Mr. Charles Barnard.

“ MR. *Hobson*, Consul for the *English* at
 “ *Venice*, having been long afflicted with
 “ the Stone in the Kidney, was at length
 “ attacked with a Fit of that Duration and
 “ Violence, as almost reduced him to De-
 “ spair; and finding no Relief from any
 “ Means that had been used; and being un-
 “ der the greatest Extremity of Pain imagi-
 “ nable, he addressed himself to *Dominicus*
 “ *de Merchettis*, a famous and experienced
 “ Physician at *Padua*, imploring of him,
 “ that he would be pleased to cut the Stone
 “ out of his Kidney, being firmly fixed in a
 “ Belief,

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“ Belief, that no other Method could re-
 “ lieve him; adding, that he was not insen-
 “ sible of the Danger, but that Death it self
 “ was infinitely more eligible, than a Life
 “ led in that Misery, under which he had
 “ long, and did then groan: *Merchetti*
 “ would very willingly have declined the
 “ Proposal, representing not only the ex-
 “ treme Hazard, but as he feared the Im-
 “ practicableness of the Operation; being,
 “ that it was, what he never had attempted;
 “ and that he feared to proceed to it, was
 “ in Effect to destroy him. But Mr. *Hobson*
 “ persisting in his Resolution, declared, that
 “ if he refused, he would never desist, till
 “ he had found out one that would do it.
 “ *Merchetti* was by his Importunity at
 “ length prevailed upon to undertake it;
 “ and having prepared him ready for the
 “ Operation, began, by cutting gradually
 “ upon the Region of the Kidney affected,
 “ so long, till the Blood disturbed his far-
 “ ther Progress; so that, closing up the
 “ Wound, he suffered it to rest till the next
 “ Day; and then accomplished the Opera-
 “ tion, by cutting into the Body of the Kid-
 “ ney, and taking thence two or three
 “ small Stones; after which he dressed it
 “ up again. *Merchetti* continued to dress
 “ the Wound for a considerable Time, but
 “ was

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“ was not able to close it up ; whereupon it
“ soon became fistulous, from the continual
“ flowing of the Urine through the Sinus ;
“ but he being, in all other Respects, restored
“ to his former Health and Vigour, took
“ his leave of the Professor, and returned to
“ *Venice*, under the Care and Management
“ of his Wife, who one Morning dressing
“ the Store, fancied she felt something
“ hard and rugged ; upon which examin-
“ ing a little more carefully with her
“ Bodkin, which served her instead of
“ a Probe, she found it to be a Stone of
“ the Figure and Magnitude of a Date
“ Stone, which being removed, he never
“ after complained of the least Uneasiness
“ in that Part. About ten Years after this,
“ he returned to *London*, where Dr. *Tyson*
“ and my self were invited to see him ; who
“ did us the Favour of viewing the Sore :
“ When we saw it, he applied nothing to
“ the Orifice but a clean Linen Rag, which
“ had a strong urinous Scent. He was then
“ as able, in Appearance, to perform all
“ the Functions of Life, as any Man of his
“ Years, being then, as I conceive, upwards
“ of Fifty ; and was the next Day to ride
“ Post forty or fifty Miles.

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*The Reflections of Mr. Charles Barnard upon
the foregoing Factum.*

* De In-
tern. Af-
fect.

THIS I think is the first Experiment of the Kind: And tho' we find it recorded by several Authors, as if it had been in Practice long before; yet scarce does any of them venture to recommend it, as an Operation that safely may be undertaken, unless a Tumor or Impostumation show the Way. *Hippocrates*, enumerating the Diseases of the Kidneys and their Cure, thus expresseth himself. * *Quum autem intumuerit & elevatus fuerit, sub id Tempus juxta Renem secato & extracto Pure, Arenam per Urinam cientia, sanato. Si enim secatus fuerit, Fugæ Spes est, sin minus, Morbus Homini commoritur.* And *Sinibaldus*, in particular, from misunderstanding this Passage of *Hippocrates*, passionately exhorts the *French* and *Roman* Surgeons to make the Experiment upon Brutes, that they might, with greater Dexterity and Readiness, perform the Operation upon Man.

BUT with Submission; this Gentleman seems by his general Exhortation to infer more from this Passage, than it will naturally bear: For, according to the Directions of *Hippocrates*, we must never perform the Operation,

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ration, be the Symptoms of the Stone never so obvious, never so grievous, unless an Apostem manifest itself externally by a Tumor; and then indeed the Necessity and Reason of the Operation are so evident, that no Man ought to decline it: Nor do we want Instances of Apostems in the Kidneys, occasioned originally from a Stone there; and manifesting themselves by a Tumor; upon opening of which Stones have been discharged with the Pus, or have soon after been removed; and this is the very Case *Hippocrates* supposes, and upon which he justly advises the Practice.

BUT it is my Opinion that we have no manner of Evidence, that Nephrotomy (restraining its Signification to cutting into the Kidney for the Stone) was in Practice in his Time, or in many Ages after: For, † *Celsus* † Corn. Cels. l. 7 c. 20. altho' he be very particular in his Discourse of cutting for the Stone in the Bladder, yet is he silent in this Matter. And *Galen*, who is copious enough upon Diseases of the Kidneys, especially the Stone, yet takes he no notice of this way of Extraction; nor indeed can I discover any Footsteps of its Practice among the *Greek* or *Latin* Physicians.

Serapion the *Arabian* is the first I can discover to have writ upon this Operation,

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* Tra&t.
4. Chap.

who delivers his Opinion of it thus. * *Quidam Antiquorum præceperunt Lapidem Renum extrahi, cum Ferro incidente retro super Latus duorum Iliorum in Loco Renum; ego autem video, quod hæc Audacia est difficilis vehementer, & administratio istius Curationis est maxime periculosa, & suspecta de morte.* Avicen had much the same Opinion of both the Operation and its Professors with his Predecessor Serapion; these are his Words, † *Sunt qui laborant extrahere ipsum per Incisionem Ilii & per Dorsum; sed est magnus Timor in eo, & Operatio ejus qui Rationem non habet:* The Sentiments of these two Authors differ only in this; that the former thought the Operation the Attempt of a desperate Fellow, and the latter of a Madman: But from Avicen's Words there is some Light to believe, it was practised in his Days, tho', undoubtedly, if it were, from his speaking so contemptuously of it, we may conclude, it was only among Persons of mean Character, such perhaps as our Mountebanks, who having little Concern for Men's Lives, venture boldly, and sometimes successfully upon those Operations, which would make more wary and judicious Men tremble to undertake.

† Page
361. Edit.
Ven. 15,
26.

* De par-
tu Cæa-
reo.

AMONG the Moderns * *Franciscus Rosettus* is the first that seriously advised this Practice:
But

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But notwithstanding his Zeal to introduce it, yet is he so ingenuous, in Support of *Hippocrates's* Authority, for cutting into the Kidney, as to acknowledge *præsentè Tumore nec aliter Hippocratem imperasse Sectionem*: And as plausible as his Reasonings may seem to be, it does not appear, that he hath been able to gain many Profelytes to his Opinion: The Sense of those Authors, that have mentioned it (who are not many) being generally against it; and concluding with
** Riolanus; Nisi natura monstrante vi-* * Vol. II.
am atque præeunte, nefas est tentare Nephro- P. 135.
tomiam.

THUS far Mr. *Charles Barnard* in his Animadversions upon the State of the Case: Wherein it clearly appears, that his Reflections are levelled against the foresaid Factum: I shall now proceed to state the Argument in Defence of the Factum against the foregoing Reflections.

Arguments in Support of the Factum against the foregoing Reflections of Mr. Charles Barnard.

ALL Authors agree, I think, that it is adviseable in Case of an Apostem. This is the Doctrine of *Hippocrates*, and the Voice of all the Antients, that have writ upon this Operation from his Time, down to the present

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sent, who come into his Sentiments: But scarce does any of them venture to recommend it, but with the foregoing Salvo, *viz. Præsentè Tumore nec aliter*: The Question then is, whether this great Operation may safely be undertaken without an Apostem manifesting it self by an external Tumor: If we demand Vouchers in support of its Success, the Case of Mr. *Hobson* already related, and that of the *Frenchman* taken notice of by Dr. *Freind* in his † *History* of Physick, are convincing Proofs not only of the Possibility of the Operation, but of the Probability of Success.

† Vol. II.
P. 135.

AND tho' Mr. *Charles Bernard*, in his Reflections, seems to favour the Arguments of those Authors, that are against the Operation, yet in the Conclusion, even he himself acknowledges, that the Success of this Experiment, plainly proves, that they were mistaken in their Sentiments, who asserted that Wounds of the Kidneys or Pelvis were mortal: What led the antient Physicians into this Mistake, was their universal Belief, that the Kidneys were vital Parts; and that consequently wounds in the principal Membranes of Organs so absolutely necessary to Life, could not happen, without being attended with the most dangerous Consequences.

AS to what the Author of the foregoing Reflections

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Reflections insinuates, from the Words of *Serapion* and *Avicenna*, as if it was practised only by little, low, mean Persons of the Profession, I answer: That this was sufficient to bring it under a Disrepute, even with Men of Judgment and Knowledge: But I desire to know whether the same Objection will not lye as strongly against divers Diseases of the Eyes: Was not the Practice of couching Cataracts almost wholly engrossed by illiterate Quacks, and our common strolling Mountebanks; till Mr. *Chiselden*, and some other Gentlemen of Figure and Distinction, in the Art, attempted to rescue this noble Branch of Surgery from the unhallowed Hands of these vile Impostors, and which they executed with a Success, that will ever endear them to Mankind.

AND the Case will always be the same: Men, under the Pressure of racking violent Pains, will demand the Assistance and Aid of the most consummate Quack or Emperick, when they find themselves given over and abandoned by Men of Judgment in the Art: And I scarce ever knew an uncommon Case, but that the Patient would run to every Emperick in Town, sooner than submit to his Fate, tho' he could not but be sensible, that his Case was above the Reach of Remedies; so resolute is human Nature
in

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in the the Use of all Endavours to protract a miserable Life.

AND tho' Nephrotomy, or cutting into the Kidney for the Extraction of the Stone, may seem a laborious Operation, yet there is less Danger, than one, who duly weighs and considers all its Circumstances, would imagine: For first the Operator is to cut clear of all the large Vessels; and consequently he need not be apprehensive of a Hæmorrhage, or any great Flux of Blood: Secondly, he is to cut upon the spinal Muscles before he comes to the Kidney; and as they are of a fleshy Substance, there is no Question to be made, but that they will easily be disposed to heal, after the Extraction of the Stone. Thirdly, Nor can I conceive the Pain to be near so great, as what affects the Patient under the Operation of Lithotomy: Because there are fewer Branches of Nerves distributed to both the Kidneys and Loins, than to the Parts cut upon, in extracting the Stone out of the Bladder: And this is the Reason, why all Stones lodged in the Kidneys give little or no Pain, while they are contained in their Substance. And lastly: As to the Membrane of the Peritoneum, that immediately invests the Kidneys, I cannot perceive any Danger to arise from its being wounded, because it is known to be cut
away

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away, in great Pieces under the Operation of divers Ruptures, without any Detriment to the rest of the Body.

Franciscus Rosettus, in his Book *De Partu Cæsario*, pleads very strenuously for the Practice of the Experiment, and thinks there are so few Obstacles in the way, that he is surprized any Gentleman should decline the Operation: This Author, after divers Arguments drawn from Analogy, tells a Story, from the Supplement to *Monstrelet*, of a French Felon, under Sentence of Death, that underwent the Operation upon Promise of his Life; and that he recovered and lived several Years after: But as *Dr. Freind* in the second Volume of his History of Physick relates it in a fuller Manner from *Mezeray's History of France*, so I shall choose to give it the Reader in the Dr.'s own Words.

The second Faëtum stated.

“ THE Doctors of the Faculty of Physick
“ at *Paris*, knowing that an Archer of
“ *Bagnolet*, who had been very much af-
“ flicted with the Stone in the Kidney, lay
“ under Sentence of Death, begged of the
“ King, that he might be put into their Hands
“ to make an Experiment, whether they
“ could open the Kidney, and take out the
“ Stone: The Operation was made, and suc-
“ ceeded so well, that the Man lived many
“ Years after in good Health. THE

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THE Reflection I would make upon this, and the foregoing Experiment is; that when any Operation has undergone two Trials with Success, there is good Reason to presume it may succeed a third, fourth or fifth Time, under the same Circumstances; and therefore that such Success is certainly a sufficient Ground for us to proceed to its Practice, as often as the Patient is willing to submit to the Operation; especially since its Adversaries are not able to charge upon the Experiment one single Instance of its ever having once failed.

AND I add, in the Conclusion of the Reflections I have made upon the foregoing two Cases, that I would not advise every unexperienced Surgeon to set up for an Adept in the Practice of this new Operation; for there is required a consummate Judgment to direct the Experiment; a steady Hand in making the Section only upon those Parts that ought to be cut; and the greatest Skill to finish the Process, with Safety to the Patient. None therefore but a *Cbeselden*, a *Bamber*, a *Nourse*; or Masters equally finished as themselves, ought to undertake it; for it has the Appearance of an extremely grand, tho' not of an extremely dangerous Operation.

CHAP.

C H A P. VI.

The Method of Cure demonstrated in discharging Stones, Gravel, and all other sabulous Matter from the Bladder.

HAVING in the foregoing Chapters proceeded to clear the Kidneys, Pelvis and Ureters of all Stones, Gravel and sabulous Concretions; and demonstrated the Probability of Success in making the Operation of Nephrotomy, where the Stone is too large to pass from the Kidneys to the Bladder; I shall now go on to lay before the Reader the most proper Methods in order to relieve the Bladder of its Pressure; for it would be only a translating of Gravel and Stones from one Organ to another, if after they are got into the Bladder we suffer them to continue, without attempting their Discharge.

Now, it is impossible that Stones can continue any Time in the Bladder, without acquiring an Encrease of Bulk; and all Encrease of Bulk in Stones, render these Concretes more difficult to pass; so that the only way to get safely rid of Stones in the Bladder, is to attempt their Discharge, as soon as ever we perceive

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perceive by any Symptoms, that they are lodged in that Organ.

WHILE indeed the Stone lies at rest in the Bladder, it will only occasion a Sense of Weight upon the Parts, without much Pain; but then it will be impossible to dislodge it, without obliging it to change its Seat; and it will be impossible to do that without putting it into Motion, and it's impossible to put it in Motion without occasioning Pain; for the Pain arises from its Motion, and is always in Proportion to the greatness of the Stone and Degrees of its Motion taken together.

THE only way therefore to discharge the Stone is to put it into Motion, and the only way to put it into Motion, is to administer the most powerful Diureticks, or those that forcibly move the Urine: It is true the Administration of the stronger Diureticks, from their stimulating the Fibres of the Kidney's, Ureters, and Bladder, will necessarily create Pain; but if this Pain is absolutely necessary, in the Nature of Things, to a Discharge of the Stone, then the Patient must either resolutely prepare himself to endure some Degrees of Pain, or suffer the Stone to encrease in Bulk, which will be attended with more dangerous Consequences.

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BUT here an Objection may arise, *viz.* May we not put the Stone into Motion, and create great Pain to the Patient, without having the desired Effect? To this I answer; That such a Failure will very rarely happen, because the Force of all Stones immersed in a watery Menstruum naturally tend to those Parts, where they meet with least Resistance; which must be towards those Parts, where the Water finds the readiest Vent; and, That, in the Bladder, upon the Discharge of the Urine, is the Neck.

BESIDES, we find, by daily Experience, that the Figures of these little Concretes, contained in the Bladder, are for the most part extremely well adapted for their Discharge; they are most of them either spiral or oblong: Now, all Bodies of a spiral, or oblong Figure immersed in a watery Menstruum, such as the Urine is, move with the spiral End foremost; because that Point meets with the least Resistance, from the lesser Quantity of Urine it drives before it; and consequently will present that End to the Neck of the Bladder for its Discharge: The Neck of the Bladder it self is admirably well contrived to give way to the Force of the Stone; for it represents a hollow, conick Tube, whose Apex is perforated, and capable of Enlargement for the Discharge of Urine, Stones,

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and

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and whatever else is lodged in the Bladder: So that if the Bole of these little Concretes be but small enough to pass the Neck, tho' with some, small Distention of the circular Fibres of the sphincter Muscle, no Question of its Discharge: And, that larger Stones are sometimes discharged with the Urine, then is generally thought, will appear from the Case of Mr. *Ducket*, who voided a Stone almost an Inch and a half long, and above an Inch about: After which he found himself as free from Pain, and as well as ever in his Life.

It would, indeed, be most commodious for the Physician, as well as the Patient, if Nature would bring on a Fit of the Stone in order to its Expulsion; but if Nature is tardy in the Execution of this Point, we must not wait the Event, but endeavour by proper Medicines to put it in Motion, and excite a Fit, in order to its Discharge; for all Delays are dangerous, and only give Time for the Stone to encrease in Bulk.

In the Prosecution of the Cure, if a Redundancy of Blood appear in the Habit, which is known from the Turgescency of the Blood Vessels, and the Hardness of the Pulse, I would advise the Patient to lose 10 or 12 Ounces: That Operation over, if the Body be costive, let oily Clysters be injected after the following Manner. ℞ Ol.

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℞ *Ol. Lin. Com. Ol. Lillior. Alb. Camæmel.*
ana ℥iii. Ol. Juniper. Chim. extract. ℥ss.
f. Enema injiciendum statim & repet.
pro re nata.

BUT sometimes the Fæces lie farther up in the Intestines; and are above the Reach of Clysters. In this Case, we must have Recourse to gentle Purgatives, and such as soften the Excrements, relax the intestinal Tubes, and lubricate the Passages.

℞ *Decoct. Sen. ℥iii. Cassiæ recenter extract.*
℥vi. Elix. Nephritic. Olei Amigd. d. ana
℥ss. f. Haust. Mane sumendus & repet.
tertio quoque Die ad tres vices.

IN the Expulsion of Gravel and little Stones from the Bladder, all of us must be sensible, that a little Force is capable of effecting these Purposes: Nay, sometimes Nature her self, without any Assistance from Medicine, will exert an extraordinary Effort in the Discharge of Stones very considerable by the urinary Passages. The following, where there is Hopes of the Stone's Discharge, I prefer to all other Administrations.

℞ *Baccar. Spin. alb. ℥ii. Sal. Nitr. Div.*
Milleped. pptt. ℥i. Nuc. Moschat. ℥ss.
R 2
f. Pulv.

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f. Pulv. in Char. x. divid. quarum i. sumat omni Mane, Hora quinta Pomerid. & Hora som. Superbib. ℥ss. Theæ ex sem. Lin. factæ & edulc. cum Mell. loco Sacchar.

THUS far, I have considered the Remedies most proper to assist the Discharge of little Stones from the Bladder, where there is no Occasion for a Diminution of their Bulk and Texture: But, if after several Efforts, we perceive, that the Stone at any Time does not pass, then we may reasonably conclude, that its Surface is too large; and, in this Case, we must either shear off part of its outer Texture, and thereby diminish its Dimensions, or enlarge the Cavity of the Neck of the Bladder by Medicines, that relax the circular Fibres of the sphincter Muscle, lubricate the Passage; and by this means render a Stone capable of passing, that could not naturally be discharged before: And because the balsamick Method is effected with the least Pain, I would advise the Patient to try its Efficacy before he submits to experience the other.

R Aq. Nephritic. Adip. Anserin. Liquefact. & non falsat. ana ℥℥. Syr. Limon, ℥ss. Spir. Nitr. dulc. 3℥s. f. Haust.

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It's impossible to conceive how much the Adeps Anserina solicits the Discharge of Stones out of the Bladder by dilating the Passages of the Neck and Urethra: Nor is there any oleose Medicine we know of so relaxing and softening to the Parts as this; for which Reason I sometimes prescribe an emollient Ointment of the same, to anoint the Parts about the Region of the Os Pubis, in order to facilitate the Stone's Passage.

THE Success of the following Mixture I often have experienced, and ever found it greatly efficacious in the Expulsion of Stones, larger than usual from the Bladder.

*R Olei sem. Lin. Aq. Theriac. ana ℥iiss.
Aq. Puleg. ℥ii Syr. Alth. ℥iss Pulv. Bo-
rac. ℥iss. Tinct. Cantharid. in fine bujus
Libri præscript. ℥iii. f. Mixtura, de qua
sumat Cochlear. iv. omni Mane & Hora
quarta post Meridiem.*

LET the Patient ride, or use some other brisk Exercise after every Dose.

BUT if notwithstanding these Methods, the Stone by reason of its Largeness cannot be discharged, we must then proceed to lessen its Bulk, by those Medicines that operate upon its Texture: For this Purpose I know nothing preferable to mild, gentle

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Acids, which for some Time persisted in, assuredly not only prevent an Encrease of Bulk, but diminish the Magnitude of Texture in the Stone, already concreted.

℞ *Succ. Limon. Aq. Nephritic. Syr. Lithontriptic. Horatii Augerii in Appendice hujus Libri præscript. ana ʒiſs. Sperm. Cæti ʒiii. Pill. Matth. ʒſs. Ol. Sulph. ʒſs. f. Mixtura, de quâ ſumat Cochlear. iii. ſingulo Mane & Hora ſomni agitando prius Vitreum.*

BUT if notwithstanding all that has been done, or can be done, the Stone is too hard to be diffolved, too large to come away; and the Patient by reason of his Age, and crazy Constitution, is in no Condition to submit to that painful and dubious Operation of Lithotomy; then, to ease his Pains, take off the Symptoms, and render Life tolerably easy, I would advise him to make use of the following, nephritick Water as the best Means to palliate the Infirmary.

It is that most excellent Water of *Paulus de Sorbait*, a Remedy ever in great Esteem with the Author; and the Benefit I owe to Mankind obliges me to translate it into *English*: It being so safe and innocent, as not possibly to disagree with any Constitution.

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Indeed it is in both the former Editions, but since their Publication I have experienced it in divers Cases, and always found it of great Efficacy, in relieving the Patient under the most violent Paroxysms of Stone, whether in the Kidneys or Bladder.

The nephritick Water of Paulus de Sorbait.

TAKE of the most juicy, large Pippins, Oranges and Lemons, each a Dozen; of Cassia newly extracted a Pound and an half: Peel the Apples, slice the Oranges and Lemons with their Rinds; and beat all together in a Marble Mortar with their Seeds and Pulps; after which mix the Cassia with them; then put all together in a large earthen Vessel, and pour upon them six Pints of Goats Milk Whey: Let all digest 24 Hours, then distil, the Author saith in a Glasse Still; but I think a cold Still with a moderate Heat may do as well. After Distillation sweeten it with double refined Sugar, and reserve it for Use.

THE Author sets it off with great Encomiums, calling it that most precious Water, he ever esteemed as a Secret; and with which he had done such signal Cures. These are his Words.

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Hæc est illa Aqua pretiosissima hætenus a me pro Arcano habita, nunc vero ex Charitatis Liberalitate effusa & proximi Bono dicata, cui non est similis: Hæc siquidem temperatissima est, nec uti reliquæ Renum intemperiem auget, aut alvum astringit, sed eam tenet apertam & paulatim omnem Arenarum Saburram everrit, vimque lapidificam & Intemperiem tollit.

AND, indeed, what he saith is worthy of our Consideration; for it does not, as many others recommended with specious Titles, heat or inflame the Kidneys, if used either in too great Quantities, or persisted in for any considerable Time, but gently relaxes the Body, and cools by its Temperateness.

AND tho' it may be objected, that the purging Quality of the Cassia will be destroyed, since it never can ascend in Distillation, by such a moderate Heat, as is here recommended; yet I dare affirm, that whoever shall be pleased to experience the Usefulness of it in Stone or Gravel, either in the Kidneys or Bladder, shall always find his Body cool and his Bowels open: And these Effects it produces by virtue of its Smoothness and Softness to the Nature and Constitution of all Bodies, wherein I have ever yet had Occasion to try its Efficacy.

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THOSE who find it too cold for their Constitutions, may add a little Wine. Four Ounces to six or eight, if drunk alone, is a sufficient Dose every Morning and Evening.



CHAP.

C H A P. VII.

*The Method of treating Ulcers of the Bladder,
arising from a Stone contained in that
Organ.*

THESE generally are the Effects of the Motion of the Stone, from the Force of too violent Diureticks, that inflame the inner Membranes of the Bladder; and break the Continuity of its Fibres, whereby an Ulcer is generated: The most proper Method, therefore, to relieve the Ulcer, is in the first Place, To restrain the Flux of Matter by proper Evacuations. Secondly, To cleanse and mundify the ulcerated Parts with deterfive Remedies. And lastly, To dispose the Ulcer to heal, by Medicines that strengthen and consolidate the broken Fibres.

BUT here I am to note, that Ulcers in the Bladder are seldom or never cured in old Men: They generally turn fistulous in Persons above 60; and then the Patient dies of a Mortification in the Bladder: And tho' the Ulcer be ever so towardly and well conditioned, yet unless the Stone be first resolved, dissolved, or extracted, no Hopes of a Cure can be expected.

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AND here I think proper to add two Caveats: The first is never to prescribe much Physick; while the Patient is under much Pain, from a Stone or Ulcer in the Bladder; for Loads of Physick, under these Circumstances, will sooner overpower the Frame of the Constitution, than relieve the Patient.

SECONDLY, Always take care to prescribe as agreeable Medicines as possible, that they may sit easy upon the Stomach, and friendly associate with the ulceratd Parts: And tho' it may be objected, that a Physician ought more to regard the Operation of his Medicine, and its Efficacy in the Cure of the Disease, rather than its Form: Yet I can answer to the Objection, and by Experience declare, that the Form, many times, shall so alter the Matter of a Medicine, as quite to invert the Nature of its Operation: Thus I have known an Opiate given in a great Hurry and Disorder of the Spirits, where the Pains have been most sharp and raging, which, being in Form liquid, and turbid from the jumbling together of many Ingredients, has been so far from quelling these Disorders, that a downright Vomiting hath ensued; and few are insensible of the bad Effects of vomiting upon Persons under the most intense Pains; and this more especially

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ally when the Order and Intention of a Medicine is so far inverted, that its Action is produced directly contrary to the Design it was given for; and instead of that sedate Tranquillity and Repose expected from its Operation; and indeed not only expected, but designed from the Administration of all Opiates, there ensues a greater Disturbance to the Nerves and Spirits: Nor can we suppose, but that such a Change, in the Operation of a Medicine, must induce new Inconveniencies, and very much augment the Hurry and Disorder of the Spirits, already too great for the miserable Patient to struggle with.

As to Evacuations, which certainly ought never to be omitted in Ulcers of the Bladder, I think Bleeding and Purging ought to precede all other Institutions.

Mittatur Sang. è Brachio ad ℥x.

℞ Cassiæ recenter extract. ℥i℞ Pulv. Cornachini ℥i. Calomel. ℥ii. Pulv. Lapid. Prunel. 3℞. Balsam. Copai. ℥ii. Syr. Violar. 3℞. f. Elect. de quo sumat 3tiam Partem 3tio quoque Mane ad tres vices.

THOSE Days he does not take the purging Electuary, let him go on with the following Balsamick Mixture to cleanse and mundify the ulcerated Parts. *℞ Vin.*

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℞ *Vin. Alb.* ℥℥. *Balsam. Copai.* ʒ℥. *Syr. Balsam.* ʒvi. *f. Mixtur. de qua sumat Cochlear.* ℥iii. *omni Mane, Hor. 5ta Pomerid. & Hora Somn.*

AFTER he has continued these Medicines some Time, and the Matter discharged from the Ulcer, begins to be well digested and of a laudable Colour, let him then take the following to strengthen and consolidate the broken Fibres, and heal the ulcerated Parts.

℞ *Conserv. Rad. Symphyti* ʒi. *Confect. Fracastor. sine Melle* ʒ℥. *Pulv. Rhei tost.* ʒi. *Pulv. Nuc. Moschat. Olib. Mastic. Balsam. Peru Sang. Dracon. ana* ʒ℥s. *Syr. de Ros. Sic. q. s. f. Elect. de quo sumat Quant. Nuc. Moschat. major. 6ta quaque Hora cum* ʒiv. *sequent.*

℞ *Rad. Symphit. major* ʒi. *Rad. Alth.* ʒ℥s. *summit. Malv. Mi. Coque in Aq. Calc.* ℥ii. *ad ℥℥ss. Colat. cui adde Aq. Nephritic.* ʒv. *Tinct. Cantharid. in Appendic. hujus Libri præscript.* ʒii. *Syr. Rosar. solut.* ʒvi. *f. Apozema.*

THESE Medicines seldom fail of Success when a Cure is to be expected; and to compleat the Affair I would advise the Patient

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to drink the Afs's Milk for a Month or fix Weeks ; and after that, go through a Course of the chalybeat Waters to cleanse the Bladder, and wash the urinary Passages, which will be a Means to prevent the Return of the Malady.

BUT sometimes I have observed that a Stone in the Bladder frequently grating against the nervous Coat, hath not only formed an incurable Ulcer, but communicated a Palsie to the Nerves disseminated in the sphincter Muscle. In this Case the Patient is in the most miserable Circumstances, it is possible for any Mortal to labour under, for he is almost continually under exquisite Pain, and his Urine comes dribbling from him in Drops ; and if he happens to make any Quantity of Urine at a Time, the Torture is augmented, and his Pains become insupportable.

THIS Case, I must confess, is incurable, especially in old People ; but to appease the Symptoms; and, in some Measure, to assuage the Pains, Means may be used; and I shall here communicate a Formula of Medicines that did very great Service, for Mr. *John Graves* of *Penrith* in *Cumberland*. The following Prescription, with some little Variation from what it is in the former Editions, is what I advised for him.

Premisso

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Premisso Haustu Cathartico ex Senna & Rheo, sumat sequentia.

℞ *Phylon. Rom. ℥ii. Camphor. gr. xvi. Ent. Ven. ℥ss. Croc. Ang. gr. vi. f. Bol. Hora som. sumendus cum Haustu sequent.*

℞ *Aq. Ceras. Nig. ℥iss. Peon. c. ℥i. Extract. Thebaic. gr. iiss. Syr. è Mecon. ℥ii. f. Haust.*

℞ *Oc. Canc. pptt. Pulv. Haly Sem. Hyoscyam a ℥ss. Castor. Ruf. Sal. vol. Succin. ana Gr. iv. f. Pulv. sumat Mane & repet. 6ta quaque Hora ad tres Vices cum ℥ss. Emulsionis seq.*

℞ *Fol. Malv. Mi. Hord. Gallic. ℥iss. Rad. Alth. recenter collect. ℥i. sem. Fœnic. dulc. 3vi. Rad. Glycer. ℥ss. Coque in Aq. Calc. q. s. ad colat. ℥ss. sub fine Coctionis injice Gum. Arabic. contus. ℥iss. & Col.*

℞ *Amigd. Dulc. excort. 3x. Sem. Papaver. alb. 3vi. Contund. quam optimè in Mortario Marmor. sensim affund. Decoct. suprapræscript. ℥iss. cui adde Aq. Peon. C. 3vi. Syr. Balsam. ℥i. Spir. Nitr. dulc. 3ii. f. Emulso.*

With the Use of these Medicines, or Medicines of the like Import, I effected more than could be expected under these dreadful Circumstances, not only in this very Case, but

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but in divers others; that since that Time have come under my Inspection: For the Emulsion in Conjunction with the other Medicines did very much quiet the irregular Motions of the animal Spirits greatly distressed with long Watchings: And altho' the Semina Papaverum are but a gentle Anodyne, and scarce contain any Narcotick Quality, yet the Sem. Hyosc. both in the Phylon. Rom. and Powders have a peculiar Virtue in restoring the lost Tone of the Bladder; and is a Specifick where the sphincter Muscle is too much relaxed, and the Patient cannot hold his Water.

In short, these Medicines had so good an Effect, that he found himself able to make his Urine in great Quantities at a Time, which, before he did Drop by Drop; and his Pains which before were continual, and grievously racking, became now intermitting: I must confess, that at the Times of making Urine, his Pains were near as great as before; but it was no small Matter of Comfort to him, that he could now enjoy some Respite from his Dolours, which before he had not done Night nor Day, for several Months. Besides, his Glass had run above sixty Years, and he was much worn out with Nephritick Paroxysms, having suffered from the Stone in either Kidneys or Bladder

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Bladder for near twenty Years; and therefore an intire Cure was less to be expected under these Disadvantages, attended with such deplorable Circumstances.

SOMETIMES it happens, that a Stone in the Bladder falling into the Neck, blocks up the Passage, and is the Cause of a total Suppression of Urine. In this Case *Fernelius* advises to mount the Patient's Heels above his Head, that the Shaking of the Body so inverted, may oblige the Stone to descend from the Neck of the Bladder: This also is the Advice of *Riverius*; but I think the Catheter or Canula well oiled, and introduced by the Urethra, to thrust the Stone from the Neck, is a more agreeable Way, and less incommodious to a Person lying under violent Pain, from a Stone lodged in the Neck of the Bladder.

NOT, that I believe the Stone in the Neck is always the immediate Cause of a Suppression of Urine; for it may happen, and many Times does fall out, that the Stone or Gravel grating upon the nervose Tunick of the Bladder, so convulses the Sphincter Muscle, that it is with great Difficulty any Urine can be voided.

THIS calls to my Memory the Case of a Gentleman, whom I assisted under a total Suppression: I prescribed him several Medicines

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dicines both to ease his Pain, and to hasten his Urine; but not finding Success to answer my Expectations; and his Friends being positive, that the Stone lodged in the Neck of his Bladder, was the sole Cause of the Suppression; I then requested that he might be searched, and a Surgeon having examined the Neck of the Bladder with his Catheter, assured me, that the Passage was secure; and that the Stone lay near two Inches below in the Cavity: Upon this I concluded that his Suppression of Urine arose from a Convulsion of the Sphincter Muscle, and accordingly prescribed for him the following Medicines, which caused a plentiful Discharge of the Urine.

Fluat Sanguis è Vena Brachiali ad ℥xii.

℞ *Phylon. Rom. ℥ii. Pulv. de Guttet. ℥i. Castor. Rus. Gr. vi. Croc. Ang. Gr. iv. Sal. Succin. Camphor. ana Gr. iii. Syr. Peon. Comp. q. s. f. Bolus statim sumendus, superbib. Haust. Emulsionis sequentis.*

℞ *Amigd. dulc. ℥i. Sem. Papaver. alb. ℥vi. Peon. Mar. excortic. ℥℥. contunde quàm optime in Mortario Marmoreo sensim affund. Aq. Hord. Aq. Cerasor. Nig. ana ℔i. cui adde Aq. Peon. Comp. ℥iii. Sacchar. alb. ℥vi. f. Emuls.*

℞ *Spir.*

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- ℞ *Spir. Lavend. Compt. Tinct. Castor. Spir. Nitr. dulc. Spir. Sal. Ammon. Laud. Liquid. ana ʒi. f. Mixtura, de qua sumat gutt. 40 vel 50, in Haustu Emulsionis tertia quaque Hora, ad quatuor Vices.*
 ℞ *Fol. Rorismarin. Flor. Lavendulæ Majoran: Rosar. Rub. flor. Camomel. ana Mi. Coque in Aq. Font. q. s. ut f. Fomentatio, & cum Calidis Stupis foveatur Pars affecta.*

WITH the Use of these Medicines, in less than three Hours, he made plenty of Urine; and all his Symptoms in two Days more, for that Time, intirely left him.

It happens, tho' rarely, that a Stone descending out of the Bladder shall stick so fast in the Urethra, as not to be forc'd out by any outward Applications: And if you attempt any internal Means, there is great Danger lest you thrust it back again into the Bladder: In this Case I have contrived a Silver hollow Canula consisting of three distinct Arches, that by the Assistance of a Spring greatly dilates the Urethra: So that being admitted to touch the Stone, and the Spring let go, the Arches fly off from each other, enlarge the Cavity of the Urethra, whereby the Stone is pressed forwards and discharged. But if this Means fail of Success,

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cess, then we must have Recourse to Surgery, and cut into the Body of the Penis, directly upon the Stone, after which with a fit Instrument, it may easily be taken out; and the Wound is to be cleansed, fomented and dressed with Medicines that digest, incarn, and cicatrize according to Art: But we ought to try all Methods to relieve the Patient, before we attempt this Operation; for it is a rugged, tho' no dangerous Experiment, and therefore ought not lightly to be undertaken.



CHAP.

C H A P. VIII.

The Question of Fact stated, concerning the Possibility of a Dissolution of the Stone in either Kidneys or Bladder, with the Objections of those that assert the Impossibility of a Dissolution.

BUT, before we proceed directly to consider the Arguments for or against the Possibility of a Dissolution of the Stone in either Kidneys or Bladder, it will be highly proper, that in the first Place, I state the Question of Fact concerning the Possibility of its Dissolution in its fullest Latitude; because many Physicians and Philosophers, both antient and modern, have divided upon this important Point; some earnestly contending, that it is absolutely impossible, in the Nature of Things, to dissolve these petrified Concretes arrived to a greater Bigness, than what can naturally pass the Cavity of the Urethra: Others as strenuously contending, that they may safely be dissolved, by carefully attending to the proper Rules of Diet and Medicines, without any Detriment to the Body.

The Point here to be settled, is to know how far the Advocates for or against a Dissolution may be defended: If the zealous

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Assertors of the Impossibility of a Dissolution contend, that it is absolutely impossible, in the Nature of Things, to dissolve a Stone in the Bladder; it will be asserting a Point absolutely false in Fact; for I shall produce several Instances in the Sequel of this Discourse, both antient and modern, of Stones that have been actually dissolved in the Bladder, and come away in broken Fragments with the Urine. And again, if the Advocates, in Defence of the Possibility of a Dissolution, contend, that all Stones may be safely dissolved without any Detriment to the Body; this will be carrying the Argument farther than it can bear: For if all Stones in the Bladder are dissolvable, how comes so many to complain of the Want of Success, and be obliged to submit to the painful Operation of Lythotomy?

I shall therefore proceed to explain the Question in Debate, and give the Reader a full View of the Sense of the Terms; or at least what I would be understood to mean by the Sense of the Terms: By the Possibility of a Dissolution I do not mean, that I am obliged to discover a Menstruum capable of dissolving all Stones in the Bladder; for first, I except from all Possibility of a Dissolution, those in whom the Stone is hereditary, and derived from their Parents: Secondly, those

also are to be given over as incurable, where the Constitution is worn out with the frequent Conflicts of painful Paroxysms: And lastly, Old Age comes under the same Predicament; And *Hippocrates* somewhere in his *Epidemeon* expressly saith *Quinquagenarii* and *Sexagenarii*, that is Persons of 50 or 60 are seldom or never cured.

BUT, by the Dissolution of the Stone, I conceive the Acquisition of a Menstruum, that, in Conjunction with a proper Diet, is capable of dissolving a Stone bread in the Bladder, from vitious Salts, introduced into the Body from an irregular manner of Living; and from which Principles most Stones derive their Origin. Thus far we have proceeded in stating the Question of Fact concerning the Possibility of a Dissolution, or what is to be understood by the Terms.

THOSE that reason against the Possibility of a Dissolution of the Stone in the Bladder, generally oppose it upon these Principles. The Textures of most Stones in the Bladder, say they, are so hard and compact as scarce to be wrought upon by any Menstruums, but such, as by their Corrosiveness, will fret and inflame the tender Membranes of the Bladder; besides, if we attentively consider the Bustle and Commotion, that must necessarily arise from such a corrosive

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Medicine, tumultuating with the Stone, in order to a Dissolution of its Texture, we shall have reason to conclude, that such a Remedy neither exists in Nature, nor can possibly be attainable from Art.

Now granting what those Gentlemen aver, in Defence of a Dissolution; that they are already in Possession of a Menstruum, that will dissolve the Stone out of the Bladder, yet this is no Conclusive Argument in Defence of its internal Administration: Neither is there the least Reason to expect a Parity of Success; for, in all Dissolutions out of the Bladder, the Menstruum immediately acts upon the Stone, penetrates its Texture, and by the Power of its dissolving Influence, rends, tears, and separates its Corpuscles asunder.

BUT the Effects must be widely different, where a Medicine is to undergo such considerable Alterations, before it comes to the Bladder, to act upon the Concrete to be dissolved: For first, in Case it be taken in at the Mouth, it must be endued with such a Power, as to suffer all the digestive Force of the Stomach and Viscera to press upon it, and still retain its pristine Qualities, and convey them unaltered into the Blood. Secondly, it must pass and repass with the circulating Fluids through the
various

various Meanders of the Body, without the least Alteration of its Texture. And lastly, being in part conveyed to the Kidneys, it must retain a Force sufficient to break a solid Stone, and dissolve and crumble it into small gravelly Corpuscles, to be discharged with the Urine; and this Operation it must not only effect once or twice, and so away; but it must have this dissolving Power and Influence upon the most hard, solid, and well compacted Stones, and also in different Constitutions.

NOR do they much mend the Matter, that attempt to inject the dissolving Menstruum into the Bladder, by the Urethra; because, by this Way of Injection, the Menstruum must be so immediately diluted with the Urine, as to lose considerably of its Virtue, of its dissolving Influence; and consequently be incapable of affecting the Stone in the Bladder, in order to its Dissolution.

THUS far we have proceeded to state the Question of Fact, with its Exceptions; and have given the Reader a View of the Objections advanced by learned Men, against the Possibility of a Dissolution; I shall now go on, and divide the present Matter of my Discourse into three argumentative Propositions; wherein I shall answer to all the
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several foregoing Objections, and reason upon each Head, with all that Justness as well as Plainness I am capable of.

PROPOSITION I.

ARGUMENTS in Defence of the Dissolution of the Stone, drawn from the Nature of dissolving Menstruums, and the Manner of their Operation.

PROPOSITION II.

ARGUMENTS demonstrating from divers Facts and Experiments of the Antients, that the Stone in the Bladder is dissolvable by proper Medicines; and that many Persons, labouring under the foregoing Affection, have been perfectly cured of the same.

PROPOSITION III.

ARGUMENTS proving from the Principles and Grounds of modern Discoveries, and divers Facts and Experiments attending these Discoveries, that the Stone in the Bladder may safely be dissolved without any Detriment to the Body.

UPON the well managing of these three Propositions, depends the Issue of this Controversy;

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troverſy: And if I make good theſe three particular Points, by plain Reasoning, ſupported with Facts, I hope I ſhall answer the Deſign of my writing, which was to demonſtrate from Experiments that the Stone is diſſolvable in the Bladder: For to reaſon from Facts, is the plainest Demonſtration that can be given of a Thing; and is like reaſoning from Example in Morals, which has the moſt powerful Influence to incline the Will to Practice.

NOW ſince I have mentioned the Antients in the foregoing Arguments, I think it will not be improper, if, before I deſcend to Particulars, I firſt obſerve to the Reader what I mean by the Antients, ſince their Practice is moſt concerned in the ſecond Proposition: And firſt, I do not confine the Antiquity of Phyſick to the Times of *Hippocrates*, who flouriſhed above five hundred Years before the Birth of our Saviour, and was cotemporary with *Democritus* the Philoſopher; nor do I limit it to the Times of *Galen*, who lived above ſix hundred Years after: But, by the Antiquity of Phyſick, I comprehend all that vaſt Space of Time, from *Hippocrates* down to the Beginning of the laſt Century, when the Circulation of the Blood began to dawn; for certain I am, that

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that the Practice of Physick in all its Essentials, was little different in the Beginning of the last Century, from what it was in the Times of *Hippocrates* and *Galen*, and few Improvements of any Consequence were made, till the immortal *Harvy* appeared in the World, and demonstrated the Circulation of the Blood, and the natural Course and Secretion of the Juices in a manner unheard of before.

THIS was a Discovery that not only did Honour to the Profession in general, but to our Country in particular; and was a Task that had long lain hid from the Foundation of this noble Art, till after Ages; and was by a peculiar Providence, reserved for the Discovery of that great Man.



CHAP.

C H A P. IX.

P R O P. I.

Arguments in Defence of the Dissolution of the Stone, drawn from the Nature of dissolving Menstruums, and the manner of their Operation.

I AM sensible, it will be expected from me, that I should divulge some specifick Menstruum, that will dissolve the Stone; some favourite Medicine, that may be deserving of that Character, or some Rules of Cure capable of effecting this Operation: But tho', I have many Times relieved the Stone and Gravel, and forced these Concretes away in great Loads of Sand with the Urine; yet these Effects were always produced by a Method agreeable to the Laws of Practice; and differing in Circumstances, according to the different Symptoms then pressing the Patient.

I shall not therefore decide upon any Menstruum of my own, because I question, whether any one Medicine, I am yet in Possession of, is deserving of the Title of a Specifick, in Affections of the Stone and Gravel; tho' some I prescribed, have given
great

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great Demonstrations of their Virtue; and relieved the Patient, when least of all was to be expected from the distracting Symptoms, that then oppressed him.

HOWEVER, as I resolve to prosecute this Subject, by a Method agreeable to the Rules of Practice; so I shall here proceed to consider the Nature of Menstruums, and their manner of Operation; and I do not question but to prove, by Facts, that it is possible to discover a Menstruum, that will dissolve a hard compacted Body, such as the Stone is, and not operate upon a soft, tender Membrane, such as the Bladder is, at the same Time: And tho' this does not absolutely prove the Dissolution of the Stone; yet it amounts to what the Learned call an Analogical Proof: I am sure, to me, it is a strong Presumption, that such a Solvent for the Stone is either treasured up in the Stores of Nature; or to be acquired by the indefatigable Pursuits of Art.

BUT in order to set this Matter in the clearest Light, I shall intreat the Reader's Patience, while I consider the Nature and mechanical Properties of some particular solvent Menstruums; whereby it will appear, that the Dissolution of Bodies arise from a mechanical Relation between the dissolving Menstruum and the Body to be dissolved; for first, It

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is necessary, that the dissolving Body should contain Corpuscles of such a Magnitude, Shape and Figure, that they may penetrate the Pores of the Body to be dissolved, agitate its solid Parts, and disengage their Contacts. Secondly, That the Disposition of the Body to be dissolved consist of such a Cohesion of Parts, as are not too hard to be overcome by the Action of the dissolving Menstruum. And, lastly, That the Corpuscles of the solvent Menstruum be of such Solidity, that like so many little Wedges or Levers, they may be enabled to force asunder the little Parts between which they insinuate.

AND hence it appears, that the Action of corrosive solvent Menstruums, whereby they dissolve Metals and Minerals, do not so much depend upon the Degrees of their Corrosibility, as an Aptitude of their Corpuscles to penetrate other Bodies, capable of being affected by their Force; that is, Corrosiveness is not so inseparably annexed to the Menstruum; but that the Body to be dissolved may suffer that Change, without that Degree of Corrosiveness. It is true indeed, few Metals can be dissolved immediately, without the Application of Menstruums corrosive in some Degree; but every Body must be sensible, that Gold, the
most

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most hard, solid and compacted Body of Metals, may be dissolved by Quick-silver, which is a Fluid so innocent, that it may be taken into the Body without the least Detriment to the Stomach: And who knows, but that, in the course of Time, we may be so happy, as to discover a Menstruum, whose Corpuscles may be so adapted to the Pores of the human Calculus, as to penetrate their Texture in the same manner, that Quick-silver does those of Gold, while its Effects upon the Bladder may not be greater than Quick-silver upon the Stomach: And to instance in the most powerful corrosive Menstruums, it appears, that a weaker corrosive Fluid will dissolve a harder metallick Body, but not a softer; while a stronger corrosive Menstruum will dissolve a softer, but not a harder at the same Time: As for Example, *Aq. Regia* will dissolve Gold, but not Silver: *Aq. Fortis* will dissolve Silver, but not Gold; yet every Body is sensible, that *Aq. Fortis* is a more corrosive Menstruum than *Aq. Regia*: And tho' distilled acid Liquors are generally thought the only Solvents of Gold, yet the honourable Mr. Boyle assures us, that the same Body may be dissolved by an alkalifate Salt, without the Assistance of any acid Liquor. And to clear up this Point; good strong white Wine Vinegar

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Vinegar will, in a few Days, dissolve so compact a Body, as the Shell of an Egg, while it leaves the thin, soft Membrane contiguous to the white intire; which is not in the least affected with its Force.

THIS Experiment clearly demonstrates, that the Operation of Dissolvents must be determined, from the Texture and Similitude of their Corpuscles to penetrate those Bodies, to which they are applied; and not from the Degrees of Corrosibility in the Corpuscles of the dissolving Menstruum: So that, according to these Principles, a Liquor capable of dissolving a hard, compact, and solid Body, may yet, from the Incongruity of its Corpuscles, be unable to penetrate a soft, thin, and tender Membrane at the same Time. I take this Experiment to be a very good analogical Answer, to those Gentlemen, that oppose the Dissolution of the Stone, upon the Impossibility of discovering a Menstruum, that will work upon the Stone, without damaging the Bladder at the same Time; for here is a Menstruum, that will work upon a harder Body than the Stone, and dissolve it, *viz.* The Shell of an Egg; and yet leave a softer Body than the Bladder it self, *viz.* The thin Membrane, contiguous to the White of an Egg, untouched.

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LASTLY,

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LASTLY, If you take any Quantity of the Juice of Grapes, and ferment it very well, after which, separate the gross Fæces, and let the depurated Liquor stand in a warm Place, for four or five Days, till it is become perfectly clear; then decant, and you will obtain a powerful Solvent for most Minerals; for it will readily dissolve Pearls, Corals, Lapis Calaminaris, Lapis Stellaris, and divers other Bodies of a harder and more consistent Texture, than even the Stone in the Bladder.

AND if the foregoing Menstruums will effect thus much, when applied to the Bodies they are to dissolve, we have great Reason to conclude, that they would produce the same Effects in a less Time upon the Stone; if any way could be found out to admit them into the Bladder, without impairing their solvent Virtues: And I have little Reason to question, but that this Point also may be safely accomplished; for I am persuaded, that an Instrument might be so contrived, as to draw off the Urine at the same Time, that the dissolving Menstruum is injected by the Urethra into the Bladder.

IN short, by all that I can conceive of the Matter, we seem in a very fair way, not only to discover the true Principles of a Dissolution, but the properest Menstruums

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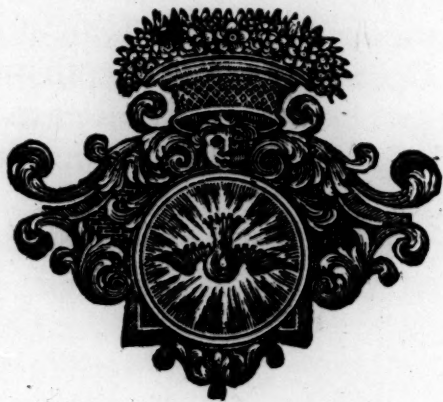
to effect it, and get out of the Bladder the largest Stones, without obliging the Patient to submit to the painful Operation of Lithotomy.

BESIDES, there is greater Reason to conclude, that a Menstruum powerful enough to dissolve the Stone out of the Bladder, will much sooner, and more effectually produce that Operation in the Bladder, if it can be conveyed to the Stone with the full Power of its dissolving Influence; because, in this Case, the Force and Endeavours of Nature will very much forward the Dissolution, and assist the Operation of the Menstruum upon the Stone; whereby its Corpuscles must more forcibly insinuate themselves into its Pores, and disunite its Texture.

To conclude, when I seriously reflect upon divers Circumstances of the Stone, I cannot but think it inconsistent with the Oeconomy of Nature, that she should afford such Varieties of Menstruums for the Dissolution of Bodies, whose Weight, Solidity, and Texture, seem very nearly allyed to the Stone in the Bladder; and at the same Time not provide a proper Solvent for the Relief of human Misery, under the Affliction of the Stone it self: If so it be, then may Nature be justly called a cruel Step-mother, who has left Mankind to groan under his Af-

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fiction, without the least Prospect of Hope; but what must arise from a Remedy, almost as much dreaded as the Disease it self; and to which many Gentlemen, rather than submit, have chosen to drag on a wretched Life, till the welcome Stroke of Death has been pleased to release them of all their Misery.



CHAP.

C H A P. X.

P R O P. II.

Arguments demonstrating, from divers Facts and Experiments of the Antients, that the Stone in the Bladder is dissolvable by proper Medicines; and that many Persons, labouring under the foregoing Affection, have been perfectly cured, by a Dissolution of the same.

IN the former Chapter, I have fully considered the Nature of dissolving Menstruums, and have incontestably proved, that they act upon the Body to be dissolved, according to the different Principles of their Figure and Motion, and not the Degrees of their Corrosiveness; I shall now proceed to discover the Principles of a Dissolution, from the Practice of the Antients: And do not question, but that I shall be able to demonstrate, that divers Persons have been cured by a Dissolution of the Stone in the Bladder; which will be a strong argument to induce us to Attempt the like Success in all Cases, where a Stone is formed in this important Organ; and before the Patient is obliged to submit

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to that painful, and very often hazardous Operation of Lithotomy.

I should very much wonder to hear of the Dissolution of the Stone in *Hippocrates's* Time, because that great Physician did little more than watch the Motions of Nature; and if she could do the Work her self, it was well for the Patient; but it was very rare, that this great Man ever took any Measures, whereby he might change the Nature of the Disease: Nor had they a Medicine in those Days of any Efficacy in the Cure of the Stone: So that *Hippocrates* gives over a Stone larger than can pass the Urethra, as incurable by Medicine; and recommends them to a set of Men, that made the Operation of Cutting their sole Practice.

BUT *Galen* his Successor speaks more dubiously of this Affair, and only tells us, that they were not so happy in his Days as to have a Remedy discovered, that would relieve the Patient by a Dissolution of the Stone; but does not take upon himself to answer for the Sagacity of future Ages.

INDEED many of their Successors speak out, and assure us of the Possibility of the Thing, from Facts, that clearly prove the Dissolution of the Stone in the Bladder possible: However, instead of wondering why the Antients did so often succeed in the
Cure

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Cure of this Disease, as both *Horatius Augenus*, *Sennertus*, and *Riverius* assure us they did, I have much more Reason to be surpris'd, that they ever could cure one single Patient, because of the preposterous Methods they treated them with.

THEY no sooner had removed the Symptoms, and cleared the first Passages with a Vomit or Purge, if either was judged necessary; but they immediately fell to Work, with the most powerful Diureticks, which frequently did occasion Stranguries, Suppressions of Urine, and Inflammations in the Pelvis, Ureters, and Bladder, by their stimulating the Nerves of those Parts: And these Consequences obliged them to desist from their Use, till by gentle, cooling, softening Medicines, they could remedy those Symptoms, the stronger Diureticks were the Cause of: And daily perceiving, that these Medicines did infer these Grievances, they, at length, began to disesteem of them as very hurtful, if not pernicious Medicines, where a Stone was already formed in the Bladder; and thenceforward, instead of a perfect Cure, only to be effected from a right Administration of the most powerful Diureticks, they terminated their Endeavours, how to obtain for the Patient, a Remission of his Pains, or an Intermission of the Pa-

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roxyfms, or at most a palliative Cure; and that is no more than a Releasement for a while.

THIS was the Practice of the Antients; and a Method, that too many of our modern Practitioners have come into, not without great Detriment to the Patient: And I cannot but own it as my sincere Opinion, that the little Success the Moderns have met with in the Cure of the Stone, is very much owing to their too strictly pursuing the antient Method of Practice.

Horatius Augenius is the first Writer, that gives us any Account of an absolute Dissolution of the Stone in the Bladder by Medicine: This Author, in the second Tome of his medicinal Epistles, positively affirms, that twice in one Day, he saw the Stone in the Bladder broken and dissolved, and both the Patients perfectly relieved from all their Pains: The first, he takes notice of, is a remarkable Case of a young Gentleman, who was perfectly freed from a Stone in the Bladder by a Dissolution of the same: The Person he speaks of was the Son of *Janetus*, Printer to the then *Roman Pontif*; who, after he had in vain tried the Advice of all the most eminent Physicians both at *Rome*, *Venice*, and *Naples*; at last despairing of Success by Medicine; and being daily har-

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raffed with intolerable Pains, did submit to have it extracted by Section; and was accordingly delivered over to *Augenius*, the Author of this Epistle, to have his Body prepared for that Operation.

BUT the Jesuit, employed in hearing his Confession, enquiring into the Nature of his Disease, proposed a Medicine of approved Virtue, which, as he averred, had done great Cures both in himself and others. The miserable Patient was pleased to experience it, and for that Reason, put off the Operation, that should have been performed in a few Hours, for some Days longer: And the ninth Day, after he had taken the following Medicine, he was perfectly freed from his Thralldom, by a Dissolution of the Stone: And for the Reader's further Satisfaction, I will here subjoin the Case as briefly as I can, in the Author's own Words.

Filium Janeti Pontificii Typographi, Romæ expurgandum suscepimus, ut postea tutior ad ipsam Sectionem accederet. Tentaverat enim antea omnia Remediorum Genera tum a Medicis Venetis tum Florentinis præscripta. Cum verò nullam Utilitatem subsequi deprehenderet, secari cupidus, Sacerdotem jussit accedere, ut si ex Sectione moreretur Animæ fuisset consultum. Requisitus fuit ex Societate Jesu, qui, audita Confessione ab Ægroto, & cogni-

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to morbi Genere, proponit illi Pharmacum, ut dicebat magni Usus, de quo & in se ipso, & in aliis periculum fecisset. Experiri placuit, neque facti pœnituit: Nam qui proximè incidi debebat, liber ab omni Calculo nono die fuit.

THE Remedy, administred to him by the Jesuit, and which effected the Dissolution of the Stone, was this following.

*R Pulv. Millepedum ʒi. ad summum ʒiv.
Aq. Vitæ ʒss. Juris Cicerum Rub. ʒx.
fiat Potio. Capiat 5que Horis ante Prandium.*

THIS was a very narrow Escape; for the Patient was just upon the Brink of being cut: All Things being ready for the Operation, when a Medicine was very seasonably offered for his Relief; and which in nine Days Time effectually cured him by a Dissolution of the Stone, and an Expulsion of all Remains of that petrified Concrete.

To the foregoing Case *Augenius* subjoins the following Relation, as a Voucher for the Possibility of a Dissolution of the Stone, that happened in his own Practice.

Ego verò Juvenem Annorum 18 calidi & sicci Temperamenti totius Corporis curaturus: duxi imminuendam Quantitatem Aquæ Vitæ; & ubi singulis Diebus datum alteri fuit Antidotum,

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tidotum, huic alterius dari jussi, & pro Refrigeratione totius Corporis Aquæ Fabarum & Fragorum ana ℥v. propinari intermedio Die cum gutt. vi. Olei de Calcantbo & ℥i. Julapi Violat.

THE Remedy he dissolved the Stone with was the following.

R Pulv. Asellor. pptt. ℥i Aq. Vitæ ℥ii, Decoct. Cicer. Rub. ℥viii. f. Potio. Capiat Horis vi. ante Prandium.

THUS far *Horatius Augenius* in Defence of a Dissolution of the Stone.

BUT there is something, in these two Cases, worthy of our Observation, besides a bare Relation of the Facts. This Gentleman was eighteen Years of Age, of a hot and dry Habit of Body; and therefore, from what *Augenius* declares of the Matter, we may justly infer, that he was inclinable to a hectic Indisposition; and for which Reason he was led to diminish that Quantity of the *Aq. Vitæ*, which, in the former Case, was given with Success, as also the Weight of the *Pulv. Asellor.* for the same Reason: And this is a plain Argument, in my Opinion, that no one Medicine, tho' ever so excellent, can be managed with that Certainty in its Operation, as to affect all

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all Diseases of the same Kind alike; for the Difference of Constitution, the Diversity of Symptoms, and different Complexion of the Disease, shall often greatly change the Effects of the same Medicine.

A further Regard he hath to the timing of his Medicine: The former having taken his five Hours before Dinner, this Gentleman six; the other every Day; the latter only every other Day. Besides, another Difference is further observable in the Cure of those two calculous Persons; the latter being subject to intense febrile Heats, rendered it a complicated Case; whereupon *Augenius* very discreetly prescribed him the *Julap. Violet. & Ol. de Calcanth.* in the Waters above mentioned, to allay the symptomatical Heats; and prevent their being exasperated, when the greatest Disturbance should arise to the Body, from the Medicines employed in a Dissolution of the Stone. However, Success did answer both Intentions: And the Stone in both was dissolved by the Power of these Medicines; and to prove those Facts no Miracles, is the principal Design I am concerned for, in writing this Treatise.

The last Instance I shall bring in Defence of a Dissolution, is the Case of an old Man, that found Relief this way. The History of this Cure, you may see in *Sen-*

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nertus, where he speaks of one *William Laurembergius*, Professor of the University of *Rostoch*; *Qui*, as he there expresses himself, *profecta jam Etate, Calculo Vesicæ diu affectus, ac Sectionis Auxilio periculosissimo sese committere nolens; de aliis Remediis cogitare cæpit.*

WE may observe from this Description, that he was far advanced in Years, had been long subject to the Stone in the Bladder, was averse to the dangerous Operation of Lithotomy; and yet was desirous of trying the Efficacy of Medicines.

FIRST, he assayed to break the Stone with that famous Remedy, in great Esteem with many Princes and Noblemen; and which is a Dissolution of *Sal. Tart. ʒi. in Aq. Petrosel. lbi.* filtered through blotting Paper, and tinctured with Orange Peel; then he tried the *Indian Gem*, called by the *Spaniards Igiada*, and by them in great Esteem for dissolving the Stone; but neither of these any thing availing him, he then was resolved to experience the Efficacy of the *Jesuit's Medicine*, or rather that of *Horatius Augenius*; the Form of which I have described above; with this Alteration only; that instead of the two Scruples of *Aq. Vitæ* was added the same Quantity of *Spir. Juniperi*: But this, instead of relieving him, exasperated

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asperated the Symptoms; to remove which, he was obliged to use Anodynes; and lastly, after he had taken the Jesuit's Medicine fifteen Days without any apparent Benefit, he was in the space of 17 Weeks, happily cured by the following Remedy.

℞ *Asellor. pptt. ℥ii. Leporis ppt. Sang. Hirc. pptt. Spong. Rosar. Sylvest. Sem. Violar. purpur. ana ℥i. Specier. Lithontriptic. ℥ii. f. Pulv. cujus accepit. ℥ii. cum sequent. Mixture.*

℞ *Decoct. Diuretic. ℥x. Spir. Juniperi ℥ii. misce.*

Decoct. Diuretic.

℞ *Rad. Glycer. ℥iv. Alth. Gramin. Ononid. ana ℥℥. Bacc. Halicacabi No. xx. Cicer. Rub. ℥iv. Uvar. pas. ℥i. Sem. quatuor frigid. Major. ana ℥i. Hord. Mii. Coq. in Aq. Alkekeng. Ononid. Frag. Flor. Fabar. ana ℥℥. Colaturæ adde Syr. de Alth. ℥iii. Misce.*

THIS Lithontriptick Powder and diuretick Mixture, compleated the Dissolution of the Stone; and Sennertus subjoins his manner of taking them in these Words. *Quod Medicamentum, ubi mane Hora quinta hausisset, secunda vice, post Horas plus minus quatuor, sub Pubis osse ad Regionem Ostii Vesicæ*

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Vesicæ Magnos sentire cæpit Dolores. Paulò post parum Urinæ profluebat, & cum ea lamellæ exiguæ instar squamæ Piscis Subrubecæ, quæ licèt aliquam Visciditatem habere viderentur, ad Tactum tamen in Sabulum resolvebantur; ita ut manifestè appareret Tunicam, vel Crustam esse à majore Calculo Solutam. Cujus Medicamenti Usus cum continuaret interdum quarto nonnunquam quinto Die, bujusmodi Lamellæ crassiores, & fragmenta sæpè grandiuscula profluxerunt. Cum verò & a Calculo & ab ejus Fragmentis Orificium Vesicæ esset sauciatum, ad leniendum Dolorem Medicamenti usus est. Atque horum Medicamentorum Usu, 17 Septimanarum Spatio, à Calculo liberatus est.

THUS much Sennertus, from which we may observe, that this Stone was dissolved much after the same manner, that it was concreted in the Bladder: For a little after he had taken the Medicine for the second Time, his Pains begun to be extremely racking, and he made a little Urine, and with it small thin Flakes, not unlike the little redish Scales of a Fish, and which, upon the Touch, were readily resolved into Gravel, being nothing but the Rinds or Coats loosened and separated from the large Stone: At last, after he had continued the Use of these Medicines every fourth or fifth Day,

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greater Fragments and Rinds of the Stone came away in his Urine, which so exasperated the Pain, that he was obliged to use Anodynes, to keep the Symptoms under; and which he did with happy Success; for in the space of seventeen Weeks, he found himself perfectly freed from the Torture of this afflicting Malady.

So far in Defence of the Practice of the Antients; and, by the Circumstances of the foregoing Cases, it evidently appears, that they attempted a Dissolution of the Stone; and sometimes attempted it with Success. I could pursue the Argument still more home, and extract from Authors of unquestionable Credit, several other Cases of a Dissolution of the Stone in the Bladder, but that would only be multiplying Quotations to no manner of Purpose; and swelling this Treatise above its intended Bulk; since I think these three Instances are sufficient to maintain my second Proposition, in Defence of the Practice of the Antients.

BUT before I conclude this Chapter, give me leave to observe to the Reader, that these several Facts are so well attested; the Circumstances in all three Cases so particularly specified; and the Reputation of the Authors so universally esteemed, that I see not, what can fairly be objected, in answer

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swer to the Conclusions drawn from the foregoing Cases, in Defence of a Dissolution: For if a Dissolution ever was effected by the Force of Medicines, then it will be a standing Proof of the Possibility of the Fact: And when an Operation is once demonstrated possible from Proofs of the Fact, to the great Ease, Relief, and Emolument of the Patient, we are then to proceed upon the most natural Principles, in order to attempt the Dissolution, in all Cases, where a Stone is formed in the Bladder: And tho' we should not be so happy, as to succeed in all Cases, that come under our Inspection; yet it must give any Man of a benevolent Spirit, a very high Pleasure to reflect, that he was instrumental, in relieving even a few from the Torture of this distracting Malady of the Stone.

C H A P. XI.

Arguments proving, from the Judgment and Practice of the most eminent modern Philosophers and Physicians, that the Stone may safely be dissolved, without any Detriment to the Body.

THUS far, in support of the antient Method of Practice, concerning the Possibility of dissolving the Stone in the Bladder: I shall now proceed to examin the Sentiments of the Moderns, and consider their Judgment and Practice in Relation to this Affair.

I must confess there are few of the Moderns, that think the Dissolution of a Stone, larger than can pass the Urethra, possible; most of these Gentlemen look upon the Attempt as a Rashness, that ought not to be undertaken: But however, few of these Authors, that pronounce thus peremptorily against a Dissolution, are Persons, that ground their Sentiments, upon any solid Principles of Reason: They are generally those, that judge with the Herd, and improve in Knowledge, as they do in Dress, which they lay aside, when it is once out of the Fashion.

I

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THE Force of Arguments, in Defence of any Proposition, drawn from the Judgment of any Author, will rise or fall, in Proportion, as that Writer was more or less remarkable for his Learning, Experience, and Penetration into the Works of Nature. And this is the properest way of judging of Authors, or the Sentiments of Persons in Cases where they assert contradictory Propositions; and consequently one Side must be false: As for Example, suppose two Authors reasoning upon the Stone, and the one absolutely denies, that Stones in the Bladder are dissolvable; and the other as stiffly maintains the Possibility of their Dissolution; and brings divers Arguments in Support of his Assertions: The Question is, how we may discover the Rule or Criterion whereby we may most properly judge of the Authority of such contradictory Assertions! Why? In this Case, I am persuaded, that their Knowledge in the Works of Nature; the Experiments they are known to have made; and the Veracity they are generally supposed to be endued with, ought very much to sway us in judging, on which Side the most evident Proofs of Truth lie.

I grant indeed, that positive Assertions without Proofs of the Fact, ought to have no

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Share in determining our Assent: And as the Proofs of Fact, or the Possibility of a Dissolution certainly lye on those, that affirm the Proposition possible; so I shall go on to produce the Judgments of two or three of the most eminent Moderns, in Support of the Dissolution of the Stone in the Bladder; and afterwards confirm their Judgments with two or three Facts, that absolutely demonstrate their Sentiments, to be conformable to the Nature and Reason of Things.

THE honourable Mr. *Boyle*, and the learned Mr. Professor *Boerhaave*, are two strenuous Advocates, in Favour of the Dissolution of the Stone in the Bladder: They are both Authors, that have given unquestionable Proofs of their untainted Veracity; and of their great Abilities in diving into the Mysteries of Nature: And therefore Persons, of such enlarged Capacities and extensive Views, must be supposed better able to judge of the Powers of both Nature and Art, than those that have taken less Pains in the Mysteries of the Sciences; and consequently their Authority ought to weigh more with any unprejudiced Reader, than the positive Assertions of ten thousand of the vulgar Writers, that generally follow one another like a Flock of Sheep; and wholly rely on the Authority of others, for what they deliver.

MR.

MR. Boyle pursues the Argument upon Principles, that will effectually answer; for he tells us, that he has discovered an innocent, potable Menstruum, that will operate upon Bodies more compact than solid Minerals; and that too more strongly, than could be expected from *Aq. Fortis*.

THIS Gentleman, in the Tract of the Usefulness of natural Philosophy to the curative Part of Physick, expresses himself thus. " I chuse, saith he, to insist on the Dissolution of the Stone in the Bladder, because that Concrete is almost universally pronounced incurable. *Cardan* relates that in his Time, there travelled a Man over *Lombardy*, who, by a certain Liquor, safely, speedily, and certainly cured the Stone in the Bladder: And *Laurembergius* has told the World, how he cured himself of the same, by *Millepedes*. *Horatius Augenius* tells us, that he cured a Youth at *Rome*, who was going to be cut for this Distemper: And indeed the best Arguments, that are brought to shew the Stone to be incurable without cutting, seem inconclusive.

" If Appeal be made to numerous, fruitless Attempts; the preceding Experiments may be opposed: If it be objected, that Medicines must lose much of their Vir-

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“ tue, before they reach the Bladder; I
 “ grant that this, in some Measure, is true;
 “ yet we know, that some Medicines do
 “ retain their Nature, after many Altera-
 “ tions and Digestions; as Turpentine, As-
 “ paragus and Rhubarb, which gives plain
 “ Indications of their affecting the Urine.

“ AGAIN, if it be said, tho’ a Liquor
 “ should be found capable of dissolving a
 “ Stone; yet it would be so corrosive, as to
 “ fret the Intestines or Bladder: I answer,
 “ that Vinegar will dissolve Crabs-eyes,
 “ which like the Stones we are speaking of,
 “ are formed in animal Bodies. The bare
 “ Juice of Lemons or Barberries readily dis-
 “ solve both Pearls and Coral: Did we know
 “ and consider well, how many Operations
 “ of natural Bodies, depend upon the Suit-
 “ ableness and Difference of the Figures of
 “ their Parts, and the Pores interspersed be-
 “ tween them, the Number of Impossibi-
 “ lities would not appear so great as they
 “ now do.

“ THAT it is very possible, for one Body
 “ to act upon another, without acting upon
 “ different Bodies, is evident from hence:
 “ That Quick-silver, which will not cor-
 “ rode the Skin, nor affect the Tongue
 “ with the least Pungency, readily dissolves
 “ the compact Body of Gold, which even

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" *Aq. Fortis*, that corrodes all other Metals
" besides, will not touch: And yet Quick-
" silver will not dissolve Iron, whilst *Aq.*
" *Fortis* instantly frets it asunder: And who
" knows, but that Art or Nature may af-
" ford a Liquor, whose Parts shall be adap-
" ted to the Pores of a human Calculus,
" in the same manner as those of Quicksilver
" are to the Pores of Gold; whilst its Ope-
" ration upon the Body shall be no greater,
" than that of Quicksilver upon Iron.

" THESE Experiments surely, prove that
" a Menstruum, not so corrosive as to fret
" the Body, may dissolve Stones and other
" compact Substances: But because the En-
" quiries of judicious Men have been greatly
" hindered, from a Supposition, that pe-
" netrating Menstrua are proportionably
" corrosive, I can assure them, that from
" common, household Bread I have ob-
" tained a Fluid, that would operate upon
" the hardest Bodies next to Diamonds and
" Rubies: And if it be farther objected,
" that the same Remedy, that dissolves the
" Stone in the Bladder of one Man, may
" fail of Success in another: To this I
" reply, That were it true, yet as the
" Specificks for Agues and other Diseases
" are justly prized, tho' their Effects are not
" equally certain in all Patients, so it would

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“ be worth knowing, that the Stone is not,
“ in its own Nature, an incurable Disease.

THESE are the Sentiments of the great Mr. Boyle, upon the Subject of a Dissolution of the Stone in the Bladder: But the learned Professor Boerhaave of Leyden goes farther and positively assures us, “ That he does not
“ despair of discovering a Menstruum, that
“ will dissolve the Stone in the Bladder,
“ and yet be so mild and soft withall, as
“ not to affect the Membranes of the Bladder. I had, saith he, a Menstruum drawn
“ from Rye Bread, that dissolved the hardest
“ Stones in the Hand, without affecting the
“ Hand: So, that Liquor distilled from Egg,
“ does not cause the least Pain in so tender
“ an Organ as the Eye; and yet dissolves
“ Myrrh, that the hottest Fire will not operate upon: And therefore, without doubt
“ such a Remedy, by human Industry, may
“ be found out, as will dissolve the Stone
“ in the Bladder, without affecting the
“ Bladder at the same Time.

THESE are the Opinions of the great Mr. Boyle and Mr. Professor Boerhaave; but as the Authority or Judgment of the greatest Authors in the World alone, is a poor Defence of a Proposition, that ought to be grounded upon Facts, so I shall proceed to enumerate two or three modern Cases that demonstratively

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tively prove a Dissolution of the Stone in the Bladder possible.

THE first Case is, of a Dissolution of a Stone, or rather Stones in the Bladder, communicated by Dr. *Laurentius Heister*, in a Letter to Mr. *de Thou*, which was read before the Royal Society at *London*, the Substance of which is as follows.

“ *Widmannus* or *Widman*, a Man upwards of 60 Years of Age, of a healthy robust Constitution; and accustomed to a coarse way of Life, had for many Years been subject to nephritick Paroxysms, and voided several Stones larger than a Pea, tho’ not without extreme Pain: About four Years after, this same Person began to feel all the Symptoms of a Stone in the Bladder; so that he could scarce ever make Water without great Pain about the Region of the Pubis and Perinæum: At length, in the Year 1728, either by the Force of diuretick Medicines, which he often took, or the Strength of Nature, which is of great Efficacy in some Cases, or thro’ drinking of a *Brunswick*, medicated Ale, famous in those Parts against the Stone in the Bladder, this Concrete was broke and discharged from the Bladder, for several Days, in a vast Number of Pieces or broken Fragments,

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“ ments, till at last, he was perfectly freed,
 “ both from the Pains, and the Stone itself;
 “ and is now alive, well, and free from all
 “ Complaints of the Stone.

“ SOME of these Pieces were of the large-
 “ ness of a Horse Bean, others not bigger
 “ than a Pea, and some less. Their ex-
 “ ternal Surfaces were convex, and their
 “ internal Concave: In both, they were
 “ very like the Lamina of Stones generated
 “ in the Bladder or Stomachs of Animals:
 “ From the different Colours of the Pieces,
 “ from the different Bigness of the Seg-
 “ ments of their Arches, and the Number
 “ that came away, it clearly appears that
 “ the Stone must either have been larger
 “ than any of the Pieces seem to import;
 “ or that there were Numbers of Stones
 “ contained in the Bladder: For from the
 “ Segments of the Pieces, which I here
 “ send you, scarce any of them seem to
 “ have belonged to a Stone, that exceeded a
 “ Nutmeg in Bigness.

“ BUT however that be, there is all the
 “ Reason in the World to believe, that this
 “ was a perfect Dissolution of a Stone in
 “ the Bladder; and which is still a Con-
 “ firmation of the Possibility of the Fact.

THE second Case was communicated to
 the Royal Society by Sir Robert Sibbald,
 and

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and is as follows. “ A Divine about seventy
“ Years of Age, had for about ten Years
“ suffered much Pain from a confirmed
“ Stone in the Bladder. In 1697, he passed
“ a considerable Number of Fragments or
“ Slices of the Stone, which were of diffe-
“ rent Shapes and Figures; many of them
“ corner’d, some pointed; but most of them
“ of the Thickness of a Shilling Sterling:
“ Their internal Surfaces were white and
“ smooth, their external of a dark Colour:
“ Sometimes great Pain, with a Suppression
“ of Urine for several, Hours preceded their
“ Discharge. He made use of the usual
“ Remedies; and during the Intervals of his
“ Paroxysms, he enjoyed a tolerably good
“ State of Health.

THESE two Cases I have related; and
the Facts and Reasonings taken notice of, in
the foregoing Chapters, do so evidently de-
monstrate the Possibility of a Dissolution,
that I cannot for my Life conceive, what
can fairly be objected to lessen their Autho-
rity.

CHAP.

C H A P. XII.

Reasons why the present Age, is not so often attended with Success; and why so few people receive Benefit by a Dissolution of the Stone, considering the many Advantages of Discoveries, we enjoy above the Antients.

BUT before I proceed to consider the Principles, Grounds, and Menstruums necessary to effect a Dissolution of the Stone in the Bladder, and the Probability of attempting that Operation with Success; I think it will not be amiss, if I first lay before the Reader the Reasons, why so few People receive Relief, in the present Age, by a Dissolution of the Stone, considering the Advantages of Discoveries we enjoy above the Antients.

CERTAINLY, from the very Nature of Things; from the many Discoveries we have made, in the several Branches of this noble Art; from the Advantages we enjoy above the Antients, upon whose Shoulders we stand; and from the Accurateness of our Pharmacy, much more of Success, in Reason, ought to be expected in our Times, and from our Practice, not only in this Disease of the Stone, but in all others, than could possibly

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possibly be expected, in those dark and obscure Times they lived in: But then, if we attentively consider the Ungovernableness of most People in this vicious Age, in relation to Medicine; and how averse they are to come into any Regulation, that thwarts Appetite, and abridges them of what they like in point of Diet; and how much the Attempt to dissolve the Stone in the Bladder, has been ridicul'd as an impracticable Operation, I am persuaded, we shall have Reason to lay a great deal of our Want of Success, to the Charge of these Lets and Impediments: For what avails all our Discoveries, when they are clogged with such insurmountable Difficulties: To what Purpose is the Advantages we enjoy above the Antients; and what signifies the Splendidence of our Pharmacy, while People are resolved to oppose, or at least live counter to the Rules and Measures necessary for their Relief.

INDEED I shall not deny, but that some large Stones, from the Compactedness of their Texture, being closely combined by their Salts; and that Complication of Distempers existing in the Body at the same Time, may concur to render the best Medicines, as well as length of Time, of no Effect. Old Age is one great Impediment:

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And it is the Opinion of both *Hippocrates* and *Avenzoar*, that *Quinquagenarii* and *Sexagenarii*; that is, Persons of 50 or 60 Years of Age, ought to be given over as incurable: Tho' in Opposition to the Sentiments of these great Men, Mr. *Constable* a Taylor in *Leather-Lane* was cured by Section, after he was sixty three Years of Age: This Person was cut by that dextrous, ingenious, and most expert Lithotomist Mr. *Fern* at *St. Thomas's Hospital*; I was present my self, and saw him cut: And, what was wonderful, he underwent the Operation without an Oh! or so much as a wry Face: And when the Operation was over, and a Stone taken from him larger than a Pigeon's Egg; the Attendants about him offered him, as is usual, a Glass of Cordial to revive his Spirits; but he told them, he was no ways disturbed, neither had he any Faintness upon him.

THE Ungovernableness and Untractableness of the Patient, both in Point of Diet and Medicine, is a consideration not of the least Importance; and in all Chronick Distempers, most commonly is one great Impediment, that retards a successful Cure: For how is it possible to imagine, that a Physician can make any considerable Alterations in any Disease, if the Patient shall
refuse

refuse to submit to those Rules and Regulations in the Nonnaturals, that, with a well constituted Course of Physick, may gain him a happy Freedom from his Thralldom? He cannot expect that his Physician, when he comes to visit, should cure him with a Glance or a Look; or that the feeling his Pulse, and inspecting his Urine, will relieve him of the Evil he labours under; I am sensible, that many People expect wonderful Changes, from the Operation of one single Medicine; and unless Success immediately answer the Prescription, they are weary of taking the Slops, as they are pleased to term them, and at once reject both the Physician and his Remedies.

We may observe the Course of the Antient Method, quite the reverse of this Practice; for we scarce read a Cure of any considerable Distemper, but what obliged the Patient to continue his Rules and Medicines a considerable Time; sometimes six Months, sometimes longer, and many Times whole Years: And these Restraints of Nature, they thought better to submit to, than to carry about them a Disease or Infirmary, that made even Life itself a Burden. The Physicians of those Days were most happy, in having such a tractable People to deal with, who thought no Regimen too Difficult,

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cult, no Course too long, when they stood in Competition, with restoring a good State of Health.

And I am the less surprized, when I find often in their Works, Cures so wonderfully effected by them, that they would pass for Miracles in our Age: Besides, if we suppose a Distemper interwoven with the Fluids; and rivetted, as it were, into the very Vitals of the Constitution; how can we think it possible, to remove the Malady, without enjoining the Patient a Course of Medicine, that, in some Measure, may equal that Length of Time, it hath been a Generating; from which Proceeding, we may expect a happy Change; and by this only Method, retrieve a weak, meagre Habit of Body, to an active, brisk, and lively Constitution again.

AND I am not at all surprized to see so many chronick Distempers, abandoned by both Physicians and the Patients, as incurable, while I perceive People many Times so impatient under that Regimen of the Non-naturals, necessary for their Recovery; and without whose Assistance it is impossible to make any considerable Advances in their Cure.

It's certain, the Antients laid the greatest Stress upon the Nonnaturals, especially Diet: And its Use proved so visibly efficacious

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cacious in the Cure of most Diseases, that some were bold to assert, that a right Regulation of the Air, Diet, and Exercise alone, would be able to cure all Distempers of the Body, without any other Assistance from Physick or Medicine.

AND I must so far confess my self, that they were the best Helps, they could lay hold of, to supply their Defects of Pharmacy; for this Branch of Physick, amongst the Ancients, was generally rude and barbarous; and most of their capital Medicines consisted of a Jumble or Hotch Potch of Ingredients very ill put together, as may be seen by those that are willing to peruse their Works.

BUT, if no Consideration of present Misery have Force enough, to stave off these irregular and vitious Courses, that brought on the Disease, but still he will regale his Appetite with Meats and Drinks, that make directly for its Increase, and exasperate the Symptoms, then adieu to any Hopes of a Cure; for it's equally as possible the best Medicines should produce any good Effects upon him, as it's possible, to raise a Man already divested of Life.

THE exploding the Dissolution of the Stone, as an impracticable Operation, is another Reason, why the Moderns are not so frequently attended with Success; for no

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sooner is a Stone known to be form'd in the Bladder, but the Patient is presently confined to the balsamick Method, and those Medicines that may appease his Symptoms, and make him easy; but no Endeavours, to dissolve the Stone, are so much as once attempted; from whence two Evils are brought upon the Patient, equally destructive of his future Peace and Quiet.

For, first, though these softening, relaxing Medicines are admirably well adapted, to assist the Discharge of the Stone from the Kidneys to the Bladder; yet, after the Stone is once formed in the Bladder, larger than can pass the Urethra, they ought to be as little used as possible; because they too much supple and relax the Fibres of the Kidneys, and thereby lessen their Force and Action; whereby the saline and earthy Parts of the Urine, in their Secretion by the renal Glands, attract each other, cohere amongst themselves, and join with the Stone already formed, for its Encrease in Bulk.

SECONDLY, This Encrease of Bulk in the Stone is the Reason why the Pains, and other Symptoms are more frequently exasperated; whereby the Patient perceiving no Solace or Comfort in Life, is willing to submit to the greatest Hazards, sooner than endure his present Misery; and consequently is, from these

these Considerations, prevailed upon to have it extracted by Section: But I must observe, that the Patient can no more expect a Cure of the Stone, from the Administration of Anodynes and Balsamicks, than that the same Methods should effect a Cure in Consumptions, tho' this Practice is too generally made use of under both Diseases.

To conclude: The Possibility of a Dissolution, and the Probability of effecting that Operation with Success, will very much depend upon discovering a Menstruum, whose Parts are so adapted to the Pores of the Stone to be dissolved, that they may readily penetrate its Texture, disengage the Contacts of the arenulous Corpuscles, and reduce the whole Concrete into a gravelly Matter, to be discharged with the Urine: And whether there be, *in Rerum Natura*, any Menstruum so powerful, as, in Conjunction with the Strength of Nature, to dissolve a Stone in the Bladder, is a Subject I shall proceed to handle in the following Chapter: For my own Part, I firmly believe, that a Dissolution is possible, and hopes that what I am going to say upon that Subject, will be sufficient to clear it from all Difficulties.

C H A P. XIII.

Of the Principles, Grounds, and Menstruums necessary to effect a Dissolution of the Stone in the Bladder; and of the Reasonableness of Attempting that Operation with Success.

I AM now come to that most difficult Point, that has perplexed the Ingenious of all Ages; and which hitherto has been called the Opprobrium Medicorum, or the Reproach of Physicians: And that is to demonstrate the Grounds of a Dissolution: The Manner how it is to be effected: The Variety of Menstruums necessary to be employed in that Operation; and the Reasonableness of attempting it with Success: For it is of little Consequence to the Dissolution of the Stone in the Bladder, that the Proposition is proved practicable; and that half a Dozen in an Age have met with Success from Medicine: The Business is to prove the Operation feasible to be done; and to lay down these practical Rules and Medicines, whereby a Dissolution may safely be effectuated: And unless we succeed in this Point, all we have said, will be of little avail, to relieve the Patient of his Misery.

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NOW, after we have got the Body clear of the Symptoms, the Pains and Disorders of the several Organs entirely quiet, and the Patient free from all Embarrassments; the next Point that comes under Deliberation, is to consider what further Relief can be given under the present Circumstances; that is, whether the Stone, that gave Disturbance to the miserable Patient, and if suffered to continue in the Bladder, will doubtless excite the same Tragedy again and again, may be dissolved by proper Medicines, and its Fragments safely expelled from the Bladder.

I think we have demonstrated, in the sixth Chapter, by unanswerable Reasons, grounded upon Matters of Fact; that Gravel and Stones, while they continue so little, as to pass the urinary Passages, may, without any Difficulty, be expelled the Body: The great Question then is, whether Stones arrived to a greater Bigness, than can pass the Urethra, may safely be meddled with by Pharmacy: And in my Judgment, they most certainly ought and may; and I hope, what I am going to urge in Defence of a Dissolution, will prove this Position practicable beyond Dispute.

NOT that I believe it possible, to resolve all Stones in the Bladder: The noble Art

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of Physick does not oblige to impossibilities; and it's no Reflection on the Profession, that sometimes a Disease may happen, not only to elude the Advice of the most able Physician, but also the Effects of the most generous Medicines: Could Physicians cure the Diseases of all Sexes, Times, and Ages, they would then be Gods on Earth, and have the Power of Life and Death wholly in their Disposal; which, to contend for, would be to usurp upon the Prerogatives of Heaven, and claiming a Power little less than bordering upon Blasphemy.

HOWEVER, if we trace back the Stone to its Origin, and examine how it came first to exist in the Body, we shall find it highly proable, that it arose from a disorderly Use of some one, or perhaps more of the Nonnaturals: That the Abuse of Diet did first vitiate the Stomach, that Indigestion followed thereupon, and that from this Fountain, crude Juices being admitted into the Blood, did impair the renal Fibres, and overmuch relax their Tone and Texture; hence a vitiated Secretion of Urine in the Kidneys; the Saline and earthy Corpuscles attracting each other, and uniting by Contact, did afford Matter for the Production of the Stone: And if this was the Origin of this petrified Concrete, then will it clearly appear what

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is proper to be done, in order to a successful Cure, that is, a Diffolution of the Stone, in case it is arrived to a larger Magnitude, than can pass the Cavity of the Urethra.

THERE are three general Indications, upon which the Grounds and Basis of a Diffolution will principally depend: The first is, how the Accretion of new Matter may be hindred from joining with the Stone, for its Encrease of Bulk: Secondly, what Menstruums will be most powerful to penetrate the Pores of the Stone, separate its internal Parts, and reduce them into their original constituent Principles of Sand and Gravel again. And thirdly, how, by the Administration of Medicines, that brace the Fibres of the Kidneys, strengthen their Tone, and restore their natural Secretions, we may best prevent the Re-generation of all future Stones in the Bladder.

THE first curative Indication concerns the Possibility of preventing the Encrease of Bulk in the Stone: And I shall despair of the Possibility of a Diffolution, unless we can effect this Point, and prevent the arenulous Corpuscles from separating from the Urine, and joining with the Stone.

In the second Chapter of the first Part, where I professedly treat of the Nature,

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Principles, and Separation of the Urine, I have there laid it down as a Postulatum, That the Separation of the solid Corpuscles of the Urine, from the aqueous Menstruum for the Generation of the Stone, depends upon the different Degrees of its Digestion by the Strength of the Stomach, and other Viscera, *viz.* The Heart, Lungs, and arterial Solids, whose Office is to break the Cohesions of the Chyle, grind down the Blood, and divide the Fluids fine enough to answer their respective Separations, Secretions, and Discharges.

NOW, as there could not be any Stone formed in the Bladder, without a Separation of the solid Contents of the Urine, from the aqueous Menstruum, and an Union of the solid Corpuscles in Consequence of that Separation; and as this Separation could not ensue without a Recedence of the foregoing Organs from their natural Standard; so it follows, that if we can restore these several Organs to their natural Strength and Action, then the Urine will be so well digested, and its Corpuscles so minutely divided, as not to be capable of a Separation during its Stay in the Bladder.

THE Consequences therefore of raising the Action and Power of the several Viscera, and Organs through which the Urine passes, before

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before it comes to the Kidneys for Secretion are, that this Fluid will be perfectly digested, and its several solid Contents so well ground down, broken and mixed with the aqueous Parts, as to become almost as light as the aqueous Fluid it self; whereupon they are secreted by the Kidneys, descend into the Bladder, and are discharged from that Organ, before it is possible for the solid Contents to separate from the fluid Mass, and join with the Stone, for its Encrease of Bulk.

BUT granting, that, by these Indications, we shall be unable totally to prevent the solid Corpuscles from separating from the Urine; yet if we consider, that all extremely minute Corpuscles of Matter move to the central Point of their Attraction, which is the Stone in the Bladder, infinitely slower in the same Medium, than they would do, if these Corpuscles were larger in Surface, and of greater Gravities; it must necessarily follow, that these Corpuscles will discharge with the Urine, before they can have Time to separate and join with the Stone: So that according to these Principles, the Stone will be longer in growing to any considerable Bigness, and consequently longer before the Patient will be put to that Torture, all Stones of a large Size will occasion in the Bladder.

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NOW, the grand Question that only remains undetermined, in Point of Cure is, whether it be possible to restore the Constitution of the several injured Parts, that both suffer under the Tyranny of the Stone, and are the Cause of the Stone's Existence (which is the Stomach, Heart, Kidneys, and Bladder) to their former Force: That is, whether it be possible to give these several Organs that Freedom of Action, they enjoyed before the Stone had a Residence in the Bladder; and, that is, to express my self in Terms as little ambiguous as possible, whether the Fits of the Stone, frequently returning, will not be apt to frustrate the Operation of the best Medicines, administered to prevent the Encrease of Bulk in Stones, already formed in the Bladder.

In answer to this Position, we are to consider, that no Stone in the Bladder can excite Pain, unless it be put in Motion; and no Stone, in those Parts, can be put in Motion, unless the Patient is too indulgent in his Diet, and eats and drinks those Things that affect the Stone in the Bladder: Therefore no Pain will trouble the Patient while he lives upon Aliments that are easy of Digestion, softening to the Kidneys and Bladder; and of friendly Nourishment to the other Organs of the Body: Therefore the
Medicines;

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Medicines, if they be fitting for his Case, may effect all that is necessary for Restoring of his Constitution, without giving any Disturbance either to the Stone, or the Kidneys, or Bladder where it is seated.

NOW, if by a proper Diet the impaired Digestions can be rectified, the Tone of the renal Fibres perfectly restored, and all the several Juices separated according to their natural Course of Secretion; then the most sanguine Opposers of a Dissolution, must acknowledge, that I bid fair for attaining the first general Indication, *viz.* The preventing the Stone's Encrease of Bulk: So that the Stone, which, before made a Progress in Bigness, being now deprived of its Nourishment, must necessarily grow effete, and decay; what I mean here by a Decay of the Stone is, that the Corpuscles, forming the Stone, losing their cementing Principle of Attraction, can no longer attach the Corpuscles of the Urine to the Stone, for want of Salts to support their Cohesions; so that the few Corpuscles, that, under these Circumstances, close with the Stone, hold their Attachment or Fastening to this Concrete, by such a weak Cohesion, that the least Impulse will be able to resolve them into Gravel again, to be discharged with the succeeding Urine.

AND,

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AND, some Stones I have observed of so loose and frangible a Texture, as to be resolved into Gravel, without the Assistance of scarce any diuretick Courses; the Strength of Nature mostly concurring to a Dissolution: What I mean here by the Strength of Nature is, that the Habit of the Body exalted to the highest State of Health, it is capable of arriving at, by the Administration of proper Diet and Medicine; or to speak of the Habit of particular Parts: The Strength of the Fibres of the Kidneys and Bladder concurring with the innate, or rather natural Heat, that I may express my self in Terms as little ambiguous as possible, may effect a Dissolution of some, soft Stones: And there are some Times, especially the Spring and Fall of the Year, when Nature summons all her Powers to expel the Enemy, and such critical Junctures are favourable Opportunities, that call for the Assistance of the most generous Remedies: And what great Effects may we not reasonably expect, from the Cooperation of powerful Solvents, acting in Conjunction with the strong Endeavours of Nature upon the Stone in the Bladder; when, from divers Experiments, it appears, that this Concrete may be dissolved out of the Bladder, by the mere Force of the Menstruum, without any Assistance from Nature.

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THE Diet most proper, to prevent an Encrease of Bulk in the Stone, are all those Things endued with the least attractive Force, which are all those Aliments, that abound least with the Principles of Salt and Earth, the two chief Ingredients of the Stone: And for this reason I hold it highly proper, that the Patient confine himself, as much as possible, to Milk, Bread, and Broth; which, being Aliments of easy Digestion and good Nourishment, can afford but very small Portions of Salt and Earth, for the Encrease of the Stone in Bulk: For the Patient's Drink I would recommend the softest, finest, and purest elementary Water he can get, and that which is freest from all terrestrial Mixtures; and this I would advise him to drink moderately warm, sweetened with Honey: But if the Patient cannot away with Water alone, then let him mix it with one third of white Wine.

THE Reason why I so earnestly recommend Spring Water, as the Basis of the Patient's Drink is, because in the History of the Royal Academy of Sciences at Paris, Anno 1720, there were several Experiments made of Calculi or Stones taken out of the Bladder, which, by only lying many Days in Water, were dissolved into a sandy Gravel: And it appears, from these Experiments that

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that Water is a proper Dissolvent for that Part of the Stone, that consists of an alcalizate, or fixed Salt.

THESE Aliments, with a Drink, consisting of such fine Parts, are not only proper to prevent the Encrease of Bulk in the Stone, but they also strengthen the Fibres of the Bladder; whereupon that Organ impresses a more forcible Impulse upon the Stone, which, in Conjunction with the dissolving Medicine, must be greatly assisting towards a Dissolution.

BUT besides Diet, I must proceed to consider the Nature of those Medicines, that are properest to prevent the Encrease of Bulk in the Stone: The reverend Mr. *Hales* seems to be of Opinion, that the Calculus makes little or no Progress in Bulk, while the Patient is under a Course of proper Diureticks: And of all Diureticks, I know nothing preferable to Turpentine Medicines: These excellently well agree in Diseases of the Kidneys and Bladder: They powerfully move Urine, and at the same Time, open the Body, which is an Advantage few Diureticks besides afford.

To scour the Glands of the Kidneys, and clear the Bladder of all fabulous Concretions, that are apt to join with the Stone for its Encrease of Bulk, I would advise the following

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following Pills and Apozem, as the most sovereign Remedies he can take.

℞ *Terebinth. è Cypro* ℥ii. *Pulv. Rad. Alth. Milleped. pptt. Croc. Pulv. Sal. Prunel. ana* ʒss. *f. Pil. è* ʒi. *Nº xii. quarum summat Nº quatuor omni Mane, & Hora somn. cum* ℥ss. *sequent.*

℞ *Decoct. pro Syrup. Alth. ℥iiss. Aq. Nephritic. ℥vi. Syr. Alth. Violar. ana* ʒi. *Ol. Sulph. per Camp. gtt. xxxx. f. Apozem.*

BUT, in all Cases of the Gravel and Stone, I must entreat the Patient to forbear the too frequent Use of the testaceous Powders; for tho' their saline Parts render them extremely Diuretick, or Medicines that greatly move Urine; yet most of them contain a great Proportion of an insipid Earth, that not only is a principal Ingredient of the Stone in the Bladder, but when taken in large Quantities, or for a long Time, certainly contribute very much to its Encrease of Bulk.

HITHERTO we have considered the Methods most Proper to effect the first general Indication, *viz.* How the Accretion of new Matter may be hindred from joining with the Stone, already formed in the Bladder: I shall
now

now proceed to discover what Menstruums will be most powerful to penetrate the Pores of the Stone, agitate its internal Parts, and reduce them into their original constituent Principles of Sand or Gravel again; for the Stone wanting its Support, from the want of new Matter daily accruing to its Surface, must necessarily either dissolve of its self, or, from a very light Force of Lythontriptick Diureticks, be easily broken in Pieces, and discharged with the Urine: In this Case the Corpuscles, that compose the outer Lamina, recede first from the Center of their Attraction, which is the Body of the Stone, for want of others to back them, and keep them firmly attached to this Concrete.

WE demonstrated in the ninth Chapter, where I professedly treat of the Nature of dissolving Menstruums, and the Manner of their Operation, that they act upon the Body to be dissolved by virtue of their mechanical Principles; and not according to the Degrees of their Corrosiveness: And that a Menstruum may actually be prepared, that will work upon a hard, dense Body; such as the Stone is, without operating upon a soft, membranous Body, such as the Bladder is, at the same Time: And the Truth of these Experiments we confirmed from the Sentiments of
of

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of the learned Mr. Professor *Boerhaave* of *Leiden*, who declares he had a Menstruum drawn from Rye Bread, that would dissolve a human Calculus in his Hand, without, in the least, affecting his Hand at the same time.

ALL Stones, upon the Application of a proper Menstruum, capable of dissolving their Texture, break, divide or dissolve, in those Parts, that are softest: All Stones are softest in those Parts, where their Corpuscles have the least Cohesions; all Stones have the least Cohesions, where their Corpuscles touch at the fewest Points: To break or dissolve a Stone, therefore, is to apply a Force to that Concrete, capable of disengaging the Corpuscles, that lye parallel to each other, from their Contacts: And, in all Cases, where a Dissolution ensues, the Stone will be dissolved so far as the Corpuscles, that lye in parallel Lines, are forced from their Contacts by the penetrating Power of the dissolving Menstruum, and no further.

THE Apparatus towards a Dissolution being thus compleated, by strengthening the impaired Digestions by the Viscera; restoring the Tone of the Kidneys and Bladder; and thereby preventing the Encrease of Bulk in the Stone; I shall now proceed to select those solvent Medicines, that are

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most

most properly adapted, to work upon the Stone in the Bladder, and dissolve it into Gravel, to be discharged with the Urine: And, by all the Observations and Experiments I have made, they appear to be reducible to three Classes; First, Those that have, for their Basis, an alkaline fixed Salt; Secondly, those that abound with gentle Acids: And thirdly: Those that partake of a penetrating nitrous Salt.

THERE are two ways of attempting a Dissolution of the Stone: The first and readiest is, by injecting the dissolvent Menstruum into the Bladder: The second, by Medicines that are taken into the Stomach, enter the Blood, and descend by the Kidneys into the Bladder: But against the former of these Methods, it has been objected; that the Quantity of Urine, in the Bladder, must necessarily so far dilute the solvent Menstruum, as to render it incapable of effecting this Operation; as appears from divers, fruitless Experiments, that have been attempted. But, in Answer to this Part of the Objection, I must observe, that I am not without Hopes of seeing this Difficulty surmounted; for I am persuaded, that a little Canula, made in the manner of a Syphon, may be so contrived with a double Cavity, as with the one, to inject the dissolving Menstruum into the
Bladder,

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Bladder, to operate upon the Stone, while, at the same Time, with the other, the Urine is drawn off from that Organ: However, till this Instrument can be perfected, we must be content to attempt a Dissolution by Medicines, that are taken into the Stomach, enter the Blood, and descend by the Kidneys into the Bladder.

A solvent Menstruum, being thus admitted into the Bladder, will act upon the Stone, by the same Principles, that occasion an Encrease of Bulk in that Concrete, *viz.* The Principle of Attraction: And, for this Reason, the Stone attracts the solvent Menstruum, which, consisting of Corpuscles, armed with sharp, ridged Points and Edges, is forcibly impelled into the outer Strata or Lamina of the Stone, where, insinuating into their Pores, it disengages the Corpuscles from their Contacts, and dissolves the Strata into Gravel, to be discharged with the succeeding Urine: And as all solvent Medicines act after this Manner, in order to dissolve the Stone into Gravel; so I shall proceed to discover the most proper Forms of Solvents, where the Basis of the Medicine is either a fixed alkalizate Salt, an acid Menstruum, or a penetrating nitrous Salt.

THE following is a most sovereign Lithontriptick, whose Basis is an alkalizate

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fixed

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fixed Salt; and a more powerful. Dissolvent, I believe, is scarce yet known to Mortals.

TINCTURA LITHONTRIPTICA.

The Stone-breaking Tincture.

℞ *Sal. Tart.* ℥i. *Aq. Saxifrag.* ℔i. *dissol.*
& filtretur.

℞ *Tinct. Spec. Diamb. sine od.* ℥iv *Camphor.* ℥ss. *Cantharid. pptt.* ℥ii. *Spir. Nitr. dulc.* ℥i. *m. f. Tinct.*

℞ *Vin. Canarin.* ℔ss. *Croc. Brit.* ℥ss. *Opii Crud.* ℥ii. *Ol. Nuc. Moschat.* ℥i. *m. f. Tinctura.*

AFTER these three Liquors have stood about seven Days in Digestion, shaking the Glass very well every Day; let them all be filtered through blotting Paper; and well united or embodied together, and kept in a Glass Bottle close stopped for Use.

THE Dose is, one Spoonful first and last every Morning, and Night going to rest. This is the most excellent Lithonriptick Medicine yet discovered; and dissolves all Stones possible to be dissolved; and evidently carries off the Fragments, by Urine, from the Bladder.

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of the Gravel and Stone. 325

THE following Medicine, whose Basis is a nitrous Salt, I have often experienced, in the Stone in the Bladder, with great Success; and actually did dissolve a considerable large Stone in a Gentleman, who could not be prevailed upon, to let his Name be mentioned in this Relation.

PULV. LITHONTRIPTICUS.

The Stone-breaking Powder.

℞ *Milleped. Viv. ℥ii. Spir. Acet. Vin. gallic. parat. ℥iv. Digerantur simul per septimanam; postea in arena calida evaporetur ad siccitatem, & in Pulverem subtilissimam reducetur.*

℞ *Hujus Pulv. ʒss. Sal. Prunel. Borac. Venet. ana ʒss. Laud. Lond. gr. ss. f. Pulv. omni nocte; sumendus superbib. ℥ss. Lact. Amigd.*

℞ *Pulv. Lithontriptic. ʒss. Sal. Nitr. Borac. Venet. ana ʒss. Pulv. Croc. Gr. v. f. Pulv. Mane sumendus cum ℥ss. jusculi avenacii tenuissimi Edulcat. Mell. Virg. ℥i.*

WHILE the Gentleman was taking these Medicines, he could often perceive the Stone to bolt against the Neck of the Bladder, and his Urine was continually crouded with a vast Load of slimy Gravel: I de-

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fired him to filter the Quantity he made at once; and the Sediment, that adhered to the Filter, weighed two Scruples and 12 Grains: So that I judged there could not be less than ziii. of Gravel and fabulous Matter, discharged in one Day: However, in about six Weeks time, to his great Satisfaction, he found himself perfectly well, and free from all the Symptoms of the Stone in the Bladder, and so continues to this Day.

I shall now proceed to lay before the Reader a most excellent Dissolvent, in which a gentle Acid is the Basis of the Remedy.

ELIXIR LITHONTRIPTICUM.

The Stone-breaking Elixir.

\mathcal{R} *Ol. Sulph. Spir. Nitr. dulc. Tinct. Spec. Diamb. sine od. Spir. Mellis ana* zss.
Balsam. Peru zii. *f. Elixir. de quo sumat. gutt. 40 ad 60 omni Mane & Hora somn. in* $\mathcal{H}\mathcal{B}$. *sequent.*

\mathcal{R} *Decoct. pro Syr. Alb.* $\mathcal{H}\mathcal{B}$. *Aq. Nephritic. (in appendice hujus libri præscript.)*
 zvi. *Mel. Virg.* ziss. *f. Apozem.*

I could prescribe several other singular Medicines, of great Efficacy in the Stone; but these, I have here prescribed, are the most potent Dissolvers, and, if rightly adapted to
the

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the Nature of the Stone, and Constitution of the Patient, will answer any Indication, where a Cure, by a Dissolution, can be expected.

BUT this observe, that if any severe Symptoms of Pain should attack the Bladder, while solvent Medicines are employed, in order to its Dissolution, we must immediately forbear their Use, till those Symptoms are, by gentle Anodynes, Balsamicks, and Opiates, made easy again: For the breaking and dissolving of the Stone will as much depend upon the Strength of Nature, in Conjunction with a proper, cooling and softening Diet, as upon the Operation of the most potent Solvents.

If the Stone happen, by Virtue of any of the foregoing Medicines, to yield to a Dissolution, the Diagnostick Signs will be evident. Great Pains immediately precede a Dissolution. The Urine, that can come away, is turbid, thick, and muddy; and vast Loads of Sand appear evidently to settle to the Sides and Bottom of the Urinal.

To remedy these Inconveniencies, we must have Recourse to Balsamicks, Anodynes, and those Remedies that are gently diuretick; for these Medicines ease the Pains, relieve the Organs, and evacuate all fabulous Concretions, that do not na-

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turally come away with the Urine; and for which End and Purpose I know nothing preferable to the following.

℞ *Gum. Guaiac. Coral. Rub. ana* ʒss. *Pulv. Camphor. gr. iii. f. Pulv. sumat* 8ta. *quaque Hora; superbib. Cochlear. quatuor sequent.*

℞ *Mucilag. (fact. ex sem. Cydon. ʒss.)* ʒxii. *Aq. Nephritic. ʒiii. Spir. Nitr. dulc. ʒii. f. Mixt.*

℞ *Vin. Alb. Lisbon. ʒss. Balsam. Capivi ʒiii. Vitell. Ovi N^o. i. Syr. Balsam. ʒi. f. Mixtura de qua sumat. Cochlear. iii. Horis duabus ante Prandium & Hora quinta post Meridiem.*

BUT if any Inflammations arise, then I should advise the following.

℞ *Pulv. Gum. Arabic. Sal. Prunel. Oc. Canc. pptt. ana* ʒss. *Pulv. Camphoræ Gr. iii. f. Pulv. 6ta quaque Hora sumendus cum Haustu. sequent.*

℞ *Amigd. dulc. ʒvi. sem. Papaver. alb. ʒss. contund. in Mort. marmoreo sensim affund. Aq. Hord. ʒiiss Colat. cui adde Aq. Nephritic. ʒiii. sacchar. Alb. ʒss. Spir. Nitr. dulc. ʒii. f. Emulsio.*

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THESE Medicines will mightily avail to ease the Pains, abate the Inflammation; and prevent the Gravel and Fragments of the Stone, as they come away, from wounding the tender Membranes of the Bladder.

WHEN all the little Fragments and gravelly Concretions, are discharged from both Kidneys and Bladder, it will be necessary then, that we proceed to effect the third and last general Indication: And consider the most proper Methods to brace the Fibres of the Kidneys, strengthen their Tone, and prevent the Re-generation of all future Stones in the Bladder.

To accomplish these Intentions, in the first Place, if he be of a bilious Constitution, and his Body subject to a Costiveness, as most calculous Persons are, then let him once or twice a Week, take the following Bolus.

℞ *Cassiae recenter extract.* ℥i. *per se*; *sumat bis in Septimana vel*

℞ *Cassiae extract.* ℥i. *Calomel.* ʒss *Ol. Nuc.* *Moschat. gutt.* ii. *f. Bol.*

THOSE Days, he does not take his opening Medicines, let him go on with the following Strengthening Electuary and Infusion.

℞ *Con-*

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℞ *Conserv. Malvæ* ℥iss. *Pulv. Cortic. Peruv.* ℥ss. *Oc. Cancror. Pulv. Test. Ovor. ana* ℥iss. *spec. Diamb. cum od.* ℥i. *cum q. s. Syr. è Cortic. Citrii f. Electuarium de quo sumat Quantit. Nuc. jugland. omni Mane, Hora quinta Pomerid. & Hora som. cum Cochlear. quinque sequent.*
 ℞ *Cortic Peru.* ℥ss. *Bals. Tolu.* ℥iii. *sem. Coriand. Cardamom. minor. ana* ℥ii. *Cin. opt.* ℥iss. *Cochinel.* ℥ss. *Sal. Tart.* ℥ii. *Coque in Aq. Font. ℥iss. ad* ℥xii. *Colat. cui adde Aq. Nephritic. ℥iv. Syr. Croc. ℥ss. f. Infus.*

THESE Medicines will restore the Tone of the Fibres, ministring to the Secretion of Urine; strengthen the Springs of the renal Glands; and prevent any Gravel, Stones, or fabulous Concretions, from settling in either Kidneys or Bladder for the future.

WHILE the Patient is taking the foregoing Medicines, he may make use of the cold Bath twice a Week; and go on with a Milk Diet for two or three Months; and for his Diverſion, he may use gentle Riding, of very great Service in most calculous Cases; and when all his Pains have entirely left him, the *Spaw* or *Piermont* Waters will be a Remedy second to none, by way of Prevention.

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LASTLY, If any little Ulcers affect the neck of the Bladder; as sometimes happen from the Discharge of large Fragments of the Stone, that fret and inflame its tender Membranes in their Passage: I should, in these Cases, advise the following Pills and Mixture, as preferable to all other Remedies.

℞ *Terebinth. è Cypro* ℥ii. *Pulv. Gum. Oliban. Mastic. Succin. alb. pptt. Sacchar. Saturni ana* ℥ss. *f. Pill. è* ℥i. N^o. xii. *de quibus sumat tres omni Mane, Hora 5ta post Meridiem, & Hora som. cum Cochlear. quatuor sequent.*

℞ *Aq. Sperm. Ran. Germ. Querc. Plantag. ana* ℥iii. *Aq. Nephrific. ℥iii. Tinct. Cantharid. in Appendice præscript. ℥ii. Syr. de Sympbit. ℥i. f. Mixture.*

AND thus I finish this Discourse, which hath been the Basis of my Practice, in the Cure of this Disease, ever since I have had the Honour to be of the Profession: And which I now republish for the Benefit and Welfare of those that are in Affliction; not pursuing therein so much my own Profit, as the Advantage and real Weal of Mankind in general; and in a particular manner, of that Community, which at present I am a Member.

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APPENDIX.

Containing some choice Medicines referred to in the Cure of the Gravel and Stone.

Elixir Nephriticum.

℞ **F**OL. Senn. ʒi. Rad. Glycer. ʒss. Rhei opt. incis. ʒiii. sem. Cardamom. Coriand. Fœnicul. dulc. Dauc. Sylvest. ana ʒii. Croc. Ang. ʒiss. Sal. Tart. ʒii. diger. in Spir. Vin. ʒiiss. Leni Calore per Dies tres; finita Digestione adde Spir. Nitr. dulc. ʒiii. Mel. Virg. ʒiii. Dosis ʒiss. ad ʒii. Mane priusquam jejunium solvit.

THIS Medicine I ordered for my Father, after he was turned of seventy Years of Age: And indeed it mightly well agrees with People much advanced in Years; for it warms a cold Stomach, cheers the Vitals, and attenuates and digests gross, thick Phlegm, which is apt to burden the Stomach, and
2
stuff

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stuff the Lungs of those that have lived freely, in their younger Years: Besides, in all Suppressions of Urine, from cold tough clammy Humors, obstructing in the secretory Strainers of the Kidneys, it is a sovereign Remedy. The Dose is three Spoonfuls in the Morning fasting.

Aq. Nephritica, or a Water proper against the Stone in the Kidneys.

℞ *Flor. Genist. recenter. col. ℥iv. Nuc. Moschat. N^o. xii. Spir. Vin. Tartar. ℥vi. Aceti optimi ℥iv. diger. per Diem naturalem & distill. ad siccitatem: Cui-dem ℔i. Aquæ adde Spir. Nitr. dulc. 3i. Dosis Cochlear. iii. Mane & Nocte.*

THIS Water very powerfully evacuates, from both Kidneys and Bladder, all sabulous Concretions. I have known almost miraculous Effects performed, as well by this Water, as the Flowers given to the Quantity of one Dram in Powder every Morning.

Tinctura Cantharid.

℞ *Spir. Nitri dulc. Tinct. Sal. Tart. ana 3vi. Cantharid. pptt. 3iss. Camphora 3ss.*

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℥ss. Nuc. Moschat. Croc. ang. Macis
ana ℥iii. Opii crudi minutim incif. ℥ii.
Diger. per Dies tres leni Calore in Vase
Vitreo bene obturato & filtretur. Dos. gutt.
xxx. ad 60. in Haustu Vin. alb. & aquæ
Fent.

IN all Suppressions of Urine it is a most
sovereign Remedy; and in Stranguries it gives
present Relief, and both relieves the Pain and
asswages the Inflammation of the Parts af-
fected. It is extremely cleansing and detergent,
and consequently an excellent Medicine, in all
Ulcers of the Kidneys and Bladder: In Can-
tharides there is an oleose balsamick Salt,
which they only communicate to spirituous
Menstruums: Observe to filter it through
brown or blotting Paper.

SYRUP. LITHONTRIPTICUS HORATII AUGENII,

The Stone-breaking Syrup of *Horatius*
Augenius.

℞ Rad. Saxifrag. Rus. Ering. Levist.
Onon. Alth. Gram. Fænic. Petrosil. ana
℥ss. Raphan. Sylvest. ℥ii. Fol. Beton.
Pimpin. Alth. Urtic. Puleg. Nasturt.
Calaminth. Polygon. min. Parietar. ana
Mi. Fruet. Alkekeng. No. xx. Sebest. No. xv.
Cortic.

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Cortic. Rad. Laur. 3iii. *sem. Ocymi Bar-*
dan. Petrofil. Dauc. Sefel. Mil. solis ana.
3ii. Uvar. Passul. Liquir. ana 3vi. Capil.
Ven. Polytric. a Mi. Coq. f. Art. in Aq.
Capillor. Ven. lbx. ad lbvi & cum
Sacchar. Alb. lbiv. & Mell. despum. lbi.
f. Syrup perfectè Coctus, & aromat.
Cinnamoni 3i. Nuc. Moschat. 3fs.

THIS Medicine is very diuretick and cleansing. It scours the renal Glands, opens all Obstructions of the urinary Passages, and forces off all gravelly Concretions, from both Kidneys and Bladder. It was in so great Request with the Author, that he could not conceive, that any Obstructions of the urinary Passages could stand before it: It consists of two sorts of Ingredients; first, those that are endued with lubricating and relaxing Properties; and secondly, those that consist of sharp, acute and penetrating Parts: And for this Reason it both softens, lubricates, and enlarges the Passages, for the Discharge of the Stone; and assists that Passage, by the penetrating Force of the diuretick Ingredients: And where the Stone happens to be formed of a soft, fabulous Matter, there it breaks its Texture, and dissolves it into Gravel again, to be discharged with the Urine.

F I N I S.



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